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THE NATIONAL POTATO-BREEDING PROGRAM, 1954

1954 Report

New Varieties
P. 3

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NATIONAL POTATO-BREEDING PROGRAM, 1954

By F. J. Stevenson

Seedling varieties resistant to several major diseases were tested for yield. The most promising of these are two early varieties, B 920-5, which is resistant to ring rot, and B 3331-7, which is immune from latent mosaic and the common race of the late blight fungus. They both outyielded Irish Cobbler significantly. Among the medium-maturing sorts B 3114-67 outyielded Chippewa significantly. It is resistant to late blight, ring rot, and scab. Bintje, one of the most widely grown varieties in Europe, yielded little more than half as much as Chippewa. A late variety NC B 880-4 yielded 568 bushels of U. S. No. 1 potatoes per acre, compared with 390 for Katahdin. NC B 880-4 is resistant to late blight. Russet Burbank, the standard variety in Idaho and one which is increasing in production in Maine, yielded 240 bushels per acre compared with 390 for Katahdin, a highly significant difference.

Total Solids

$$240 = 61\% \text{ of } 390$$

In a test of 28 varieties and seedlings, Delus, Green Mountain, Merrimack, and B 595-76 were all significantly higher in total solids than Russet Burbank, and Ganso, Cherokee, Kennebec, Keswick, Pungo, and three numbered seedling varieties were in the same class as Russet Burbank. This indicates that many varieties that are now available to growers are just as high in total solids as Russet Burbank when grown in Maine.

Late Blight

The year 1954 will be recorded as one of the worst blight years on record in Maine. Cool, cloudy weather, with intermittent showers, prevailed throughout the growing season. Many physiological races of the late blight fungus were found in the field.

Several seedlings escaped infection and others were found with very few lesions on their leaves. The performance of 4 new late-blight-resistant varieties, Delus, Merrimack, Kennebec, and Saco, in comparison with Katahdin and Green Mountain, were outstanding. Relatively high yields were obtained from the 4 blight-resistant varieties when no fungicide was applied, but the yields of the 2 susceptible varieties in the plots grown without fungicide were very low, and considerable tuber rot developed. The plots sprayed with basic copper every 7 days yielded consistently higher than those receiving no fungicide, but even with the basic copper sprays Green Mountain and Katahdin yielded only about 50% of a normal crop.

The report of John Niderhauser, Mexico, is very encouraging. He says: "For the second consecutive year the seedlings sent to us by Dr. F. J. Stevenson were field-exposed to a very severe test for late blight resistance at Toluca, Mexico. No seedling was immune. Of the 4,747 seedlings read for late blight resistance, 4,504 (95%) were very severely blighted or killed. Approximately 200 selections were made from seedlings with varying degrees of resistance."

The best sources of resistance were Ac 25953 and Ac 25949. Eleven superior families were noted on August 10. Ten of these had one or the other of the above accession numbers as one of their parents. Ac 25953 and Ac 25949 were among a number of blight-resistant selections sent to us by Dr. William Rudolf, Max-Planck Institute, Voldagsen ber Elze, Germany.

Dr. Niederhauser thinks the cooperative tests for blight resistance in the Toluca Valley in Mexico are of great value to the people of that country. The information that we get from there is of great value to us also.

In the fall of 1954 many thousands of seedlings were screened for resistance to several physiological races of late blight in the greenhouse at Beltsville, Md. Several thousand of the survivors will be sent to Dr. Niederhauser in Mexico for another test with the races prevalent in the Toluca Valley.

Scab

Uniform scab nurseries were grown again in California, South Carolina, Washington, Maine, Michigan, Minnesota, North Dakota, Wisconsin, and Wyoming. The results can be seen in the various State reports. At Aberdeen, Idaho, scab and ferric chloride readings of the periderm were correlated on 450 seedling lines and varieties. A highly significant correlation (-0.477) was obtained.

Verticillium Wilt

Some of the tests for resistance to verticillium wilt have been grown on the same field at Caribou, Maine, for 3 successive years. Judging from the wilt infection on the susceptible check varieties the general level of infection in 1954 was lower than that for 1953 and the infection in 1953 was less severe than that for 1952. This was in spite of the fact that each year the vines and other refuse from the wilted plants were left on the ground. Again, there was little or no correlation between percentage infection and yield. Ontario with 4% wilt yielded 525 bushels of U. S. No. 1 potatoes per acre, but Saco yielded 585 bushels per acre in spite of 55% wilt.

Young plants of 21 wild species and 6 interspecific hybrids were inoculated with the verticillium wilt organism. Plants of species Solanum parodii, S. macolae, S. schickii, and hybrid S. caldasii x Katahdin failed to become infected with wilt. These species will be retested.

At Rexburg, Idaho, verticillium wilt symptoms appeared early and were very severe. 41956 was outstanding in resistance, yield, and quality. Kennebec,

although seriously affected by the disease, produced a significantly higher yield of U. S. No. 1 tubers than did Russet Burbank. Highly significant negative correlations were again found between verticillium wilt and total yield.

Virus Y

Three plants of 30 species and a number of species hybrids were sap-inoculated with a moderately virulent strain of virus Y when the plants were 3 to 4 inches tall. Plants of 24 species gave typical current-season symptoms of virus Y infection. Plants of 3 species and 3 hybrids initially developed local lesions on the inoculated leaves and later top necrosis developed in 2 species and 2 hybrids, but typical mottle was observed on the remaining species and the remaining hybrid. One species proved to be a symptomless carrier of virus Y.

Solanum Species and Species Hybrids

At Beltsville, Md., in 1954, 47 species and clones and 28 interspecific hybrids of the genus Solanum were grown for crossability and cytological investigations. Following controlled pollinations, seed was obtained from 29 self- or intra-specific pollinations and from 198 interspecific pollinations. Seed was obtained from 59 pollinations involving interspecific hybrids.

New Varieties

Three seedlings mentioned in last year's report have been released. B 73-18 was named Delus and released jointly by the U. S. Department of Agriculture and the Delaware Agricultural Experiment Station. B 355-144 was named Merri-mack and released by the U.S.D.A. and New Hampshire. B 606-67 was named Saco and released by the U.S.D.A. and Maine. Descriptions of these three will soon appear in the American Potato Journal.

Two new seedlings, B 73-10 for the eastern section of North Carolina, and NC B 880-4 for the western section of North Carolina, will be released shortly. B 73-10 will be named "Plymouth" and NC B 880-4, "Boone." Release notices of these soon will be available.

PLANT INDUSTRY STATION (Beltsville, Md.) and
CHAPMAN AND AROOSTOOK FARMS (Presque Isle, Maine)

F. J. Stevenson, R. V. Akeley, R. W. Buck, Jr., E. S. Schultz,
R. E. Webb, and Lillian Cash

Plant Industry Station

At the Plant Industry Station, Beltsville, Md., crosses were made in the greenhouse involving yield and market and cooking qualities, combined with resistance to mild, latent, and veinbanding mosaics; leaf roll; net necrosis; scab; late blight; verticillium wilt; ring rot; hopperburn; and golden nematode. Crosses were made that should produce varieties with multiple resistances. Also, many crosses were made for the southern region, and seed was sent to several States in other regions and to foreign countries.

Distribution

As in former years, an important phase of the work is the distribution of seed, new seedlings, and tubers of named and numbered varieties. A summary of the shipments made in 1954 is given in P. I. tables 1 to 4. The seed, new seedlings from the greenhouse, and small lots of material for foreign countries were shipped from the Plant Industry Station, but many shipments were made directly from Presque Isle, Maine.

P. I. table 1. Distribution of potato seed to State agricultural experiment stations and to foreign countries, 1954.

State, Territory or foreign country	Cooperator	Progenies
Japan	Toshio Nagata	18
Alaska	C. H. Dearborn	26
Louisiana	T. P. Dykstra	40
Maine	R. V. Akeley	6
Michigan	C. E. Peterson	44
West Virginia	M. E. Gallegly	19

P. I. table 2. Distribution of new seedlings from greenhouse at Beltsville, Md., 1954.

Country or State	Cooperator	Progeny No.	Seedlings No.
Colombia	L. E. Heidrick	27	1185
Mexico	John S. Niederhauser	99	5547
Louisiana	T. P. Dykstra	26	1647
Maine	G. W. Simpson	28	5850
Maine	R. V. Akeley	205	27695
North Dakota	Wm. G. Hoyman	42	4157
Ohio	J. P. Slesman	17	3202
West Virginia	W. E. Gallegly	78	2804

P. I. table 3. Distribution of named and numbered varieties of potato to foreign countries.

Country	Cooperator	Varieties No.
Argentina	A. E. Cavia	18
Belgium	N. Rigot	4
Brazil	Josue A. Deslandes	20
Canada	J. A. Menzies	2
Canada	G. W. Ayers	1
Canada	Elzear Campagna	3
Canada	John Bugarin	7
Germany	Wilhelm Rudolf	9
Germany	Hans Siebeneick	40
Guatemala	Francis J. LeBeau	10
India	H. C. Choudhury	10
India	A. R. Khan	19
Indonesia	Frederick P. Hubert	23
Israel	I. Slomnicky	23
Italy	Vittorio Sangnineti	1
Israel	Joseph Lew	13
Netherlands	H. J. VanKretschmar	9
New Zealand	R. G. Robinson Ltd	15
Pakistan	Embassy of Pakistan	19
Scotland	William Black	5
Uruguay	John Bugarin	7

P. I. table 4. Distribution of named and numbered varieties to States.

State	Cooperator	Variety No.
California	Glen N. Davis	43
California	D. C. Erwin	1
Colorado	W. C. Edmundson	3
Connecticut	Arthur Hawkins	15
Delaware	E. P. Brasher	17
Florida	A. H. Eddins	15
Florida	John T. Waters	5
Georgia	Raymond Sheldrake, Jr.	2
Idaho	John McLean	19
Louisiana	T. P. Dykstra	15
Maine	R. V. Akeley	32
Maryland	James G. Kantzes	16
Massachusetts	C. V. Kightlinger	55
Massachusetts	Robert Mullany	10
Michigan	J. H. Muncie	12
Michigan	N. R. Thompson	32
Minnesota	Ralph S. Grant	9
Minnesota	O. C. Turnquist	32
Montana	H. N. Metcalf	2
New Jersey	John C. Campbell	29
New York	M. N. Meadows	15
North Dakota	W. G. Hoyman	34
Pennsylvania	R. H. Treadway	6
Pennsylvania	R. E. Hartman	30
Pennsylvania	J. S. Cobb	14
Rhode Island	James E. Sheehan	20
South Carolina	Wm. M. Epps	14
Texas	J. M. Coruthers	21
Texas	G. W. Adriance	29
Washington	J. D. Menzies	32
Wisconsin	R. H. Larson	10
Wisconsin	E. D. Jones	4
Wisconsin	G. H. Rieman	32

Chapman Farm, Maine

On the Chapman Farm 17 named or numbered varieties were increased. Approximately 470 bushels of early harvested seed was saved for distribution and other purposes. Three thousand one-hundred sixty-seven advanced selections were grown in 10-hill rows for various tests and for distribution to cooperators. About 28,000 seedlings grown in 3-inch pots in the greenhouse at Beltsville, Md., were planted for increase on the Chapman farm. Due to an unfavorable planting season only 85.7% of them grew; and approximately 10% of these were selected for various tests in 1955. P. I. table 5 gives a summary of the selections made from the single hills and the approximate number planned for each test in 1954.

P. I. table 5. A summary of single-hill seedlings grown on the Chapman Farm in 1954, showing the number planted, the number grown, the number selected, and the number intended for the 1955 tests.

Planted	Grown	Select- ed	Late blight	Scab	Ring rot	Virus X	Virus A	Virus Y	Vert. wilt	Leaf roll	Vitamin C
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
27,985	23,977	2,483	1,037	668	279	494	933	343	330	398	799

Forty-eight seedlings in 5-hill rows and 799 first-year seedlings were grown for the vitamin C test conducted by W. C. Kelly at Cornell University, Ithaca, N. Y. At harvesttime Dr. Kelly took these seedlings to Ithaca by truck where he will test them for vitamin C content.

Maturity and fertility notes were taken on the 3,167 seedling selections in 10-hill plots on the Chapman Farm. Due to the rainy season the maturity notes are considered of very little value. About one-third of the seedlings ranged from low to high in self-fertility.

Aroostook Farm, Presque Isle, Maine

The season in Maine was unfavorable for potato production, but interesting results were obtained from most of the tests.

Yield Tests

High yielding early varieties are few in number, but in 1954 two seedling varieties, B 920-5 and B 3331-7, outyielded Irish Cobbler significantly. B 920-5 is early maturing and resistant to both ring rot and late blight. It yielded 544 bushels of U.S. No. 1 tubers per acre compared with 458 for Irish Cobbler. B 3331-7 is early, immune from latent mosaic, and the common race of the late blight fungus. It yielded 535 bushels of U.S. No. 1 potatoes per acre. (P. I. table 6).

P. I. table 6. Early variety yield test Aroostook Farm, Presque Isle, Maine, 1954.

Variety	U. S. No. 1 yield per acre		Solids
	Bu.	Pct.	Pct.
Early Gem	404	91	16.2
Irish Cobbler	458	91	18.4
B 920-5	544	94	15.5
B 1359-34	294	84	15.5
B 1359-95	153	77	15.6
B 2896-10	464	95	19.5
B 3114-35	428	97	16.7
B 3324-3	502	97	19.2
B 3331-7	535	92	16.9
L. S. D. 5% level	48.3		0.9

Among the medium-maturing sorts La Soda, B 605-10, B 3114-67, and B 3234-2 outyielded Chippewa significantly. La Soda is a red variety but is not resistant to any of the major diseases. It yielded 527 bushels of U. S. No. 1 potatoes per acre. B 605-10 is a blight-resistant variety. It produced 597 bushels per acre outyielding Chippewa at the 1% level, and ranked second among 17 varieties in percentage solids. B 3114-67 yielded 530 bushels per acre. It is resistant to late blight, ring rot, and scab. B 3234-2, another blight-resistant variety, yielded 561 bushels of U. S. No. 1 tubers per acre. The odds were better than 99:1 that it yielded higher than Chippewa.

Bintje, one of the most widely grown varieties in Europe, yielded little more than half as much as Chippewa (P. I. table 7).

Late varieties B 880-4, B 2368-4, B 2894-24, and B 3353-9 outyielded Katahdin at the 1% level. B 880-4, a blight-resistant seedling, has shown much promise in western North Carolina. There is some demand that it be released for that section. It yielded 568 bushels of U. S. No. 1 potatoes per acre compared with 390 for Katahdin. B 2368-4 is a red-tuber scab-resistant variety. It has produced high yields consistently for the past 4 years, but its tubers are usually rather rough. B 2894-24 is resistant to mild mosaic and late blight, and B 3353-9 is resistant to late blight and ring rot. Russet Burbank, the standard variety in Idaho and one which is increasing in production in Maine, yielded 240 bushels per acre compared with 390 for Katahdin (P. I. table 8).

P. I. table 7. Medium-maturing variety yield test, Aroostook Farm, Presque Isle, Maine, 1954.

Variety	U. S. No. 1 yield per acre		Solids
	Bu.	Pct.	Pct.
Bintje	256	55	17.9
Chippewa	475	86	15.7
Dazoc	493	86	16.9
La Soda	527	95	16.7
Osage	262	88	17.2
Sheridan	474	85	17.2
B 579-3	307	76	17.6
B 605-10	597	95	18.4
La. 836	516	98	18.4
La. 839	465	96	17.3
La. 840	454	96	17.5
B 3114-67	530	99	15.5
B 3170-33	456	97	19.4
B 3234-2	561	97	17.2
B 3262-1	453	92	16.2
B 3310-1	272	77	15.5
B 3334-11	396	89	14.9
L.S.D. 5% level	52.3		0.9

P. I. table 8. Late-maturing variety yield test, Aroostook Farm, Presque Isle, Maine, 1954.

Variety	U. S. No. 1 yield per acre		Solids
	Bu.	Pct.	Pct.
Katahdin	390-11	86	17.5-4
Knik	477-6	93	18.2-2
Manota	376-12	82	16.9
Russet Burbank	240-14	61	18.6-
B 638-16	419-10	93	16.9
B 724-1	442-8	97	15.5
La 835	428-9	93	17.5-4
NC (B880-14)	568-1	92	17.4-5
B 922-6	341-13	88	19.2-1
B 926-9	463-7	90	16.9
B 1359-57	205-15	81	14.8
B 2368-4	532-3	96	17.9-3
B 2368-11	479-5	87	15.7
B 2894-24	527-4	95	18.2-2
B 3353-9	543-2	97	17.4-5
L.S.D. at 5% level	76.3		0.8

Late Blight Injury as Reflected in Yields and Percentage solids

The 1954 season will be recorded as a bad blight year in Maine. Rainy weather throughout the season interfered with the application of fungicides, and the fungicides that were applied were soon washed off. Under such conditions blight developed rapidly, the vines of susceptible varieties were killed early, yields were reduced, and much rot was found in the tubers.

The performance of the new late-blight-resistant varieties Delus, Merrimack, Kennebec, and Saco in comparison with 2 susceptible varieties was outstanding. These 6 varieties were grown with 4 treatments of fungicides and insecticides. The results of these tests are given in P. I. table 9.

P. I. table 9. Reactions of potato varieties to late blight as reflected in yields and percentage solids^{1/}, Aroostook Farm, Presque Isle, Me., 1954.

Variety	Treatments, yield, and percentage solids											
	None			DDT			Basic copper			Basic copper + DDT		
	U.S. #1	Solids		U.S. #1	Solids		U.S. #1	Solids		U. S. #1	Solids	
	Bu.	%	%	Bu.	%	%	Bu.	%	%	Bu.	%	%
Gr. Mountain	72	35	16.9 ⁻⁵	72	38	17.4	224	69	20.1	287	73	20.9
Katahdin	93	51	15.8 ⁻⁶	114	52	15.5	269	80	17.4	271	81	17.4
Delus	414	95	20.1 ⁻¹	384	95	19.9	430	96	20.9	448	96	21.7
Kennebec	567	94	19.1 ⁻³	560	94	18.7	608	94	20.5	646	91	20.7
Merrimack	409	92	19.7 ⁻²	480	92	19.9	486	94	21.6	540	94	21.7
Saco	553	88	19.0 ⁻⁴	608	88	19.0	637	89	21.4	674	90	21.6
LSD at 5%	60		0.8	60		0.8	60		0.8	60		0.8

^{1/} Based on specific gravity of tubers.

Sprays were applied at 7-day intervals throughout the growing season regardless of the weather. Relatively high yields were obtained from the 4 blight-resistant varieties when no fungicide was applied, but the yields of the 2 susceptible varieties in the plots grown without fungicide were very low and considerable rot developed in the tubers. Even when basic copper was applied every 7 days Green Mountain and Katahdin yielded about 50% of a normal crop.

The effects of the 4 treatments on dry matter are worthy of note. The percentage solids on the plots sprayed with basic copper were consistently higher than those receiving no spray and those receiving DDT alone. Statistically, the differences were highly significant but no explanation will be attempted at this time.

The results of these tests in 1954 emphasize the value of resistant genes in potato varieties in Maine in a bad blight year.

Verticillium Wilt Resistance

R. V. Akeley, F. J. Stevenson, D. Folsom, and R. Bonde

The 1954 tests for verticillium wilt resistance to infection from infested soil followed the same pattern as those for 1953. Five hundred eighty-seven selections from 26 family lines were included in the 5-hill row test. Houma, Katahdin, and Pungo were planted at 50-row intervals throughout the field as checks. In addition, 15 named or numbered varieties were included in the test. P. I. table 10 gives the results for these tests.

P. I. table 10. Verticillium wilt resistance test, 5-hill plots, on the Ashby Farm, Caribou, Maine, 1954.

Pedigree No.	Parentate	Select- ions tested	Selections infected		Readings based on total hills		Hills infected
		No.	No.	Pct.	No.	No.	Pct.
B 3401	B 922-3 x Menominee	25	19	76	125	55	44
B 3406	B 922-18 x (X528-170)	3	2	67	15	4	27
B 3410	Kennebec x Menominee	35	31	89	175	102	58
B 3415	Menominee x B 2429-138	19	13	68	95	25	26
B 3416	Menominee x (X528-170)	7	6	86	35	16	46
B 3417	Menominee x Saranac	7	6	86	35	13	37
B 3418	Menominee x B 881-12	17	4	23	85	23	27
B 3420	Mohawk x (X528-170)	6	1	17	30	16	53
B 3422	B 402-1 x Menominee	5	1	20	25	13	52
B 3424	B 595-76 x B 936-12	31	26	84	155	71	46
B 3425	B 595-76 x (X528-175)	4	3	75	20	9	45
B 3427	B 595-76 x Earleine	46	38	83	230	104	45
B 3429	B 606-37 x Menominee	27	2	7	135	58	43
B 3434	B 779-1 x Menominee	10	0	100	50	32	64
B 3443	Ac.25786 x (528-170)	29	10	34	145	47	32
B 3456	B 2368-4 x (X528-176)	3	1	33	15	8	53
B 3469	Chippewa x Menominee	31	2	6	155	116	75
B 3473	Earleine x B 936-12	32	22	7	160	65	41
B 3475	Houma x Menominee	40	28	70	200	88	44
B 3477	B 766-45 x Furore	40	14	35	200	26	13
B 3480	Ac.25931 x (X528-170)	19	17	89	95	68	72
B 1392	Menominee selfed	25	21	84	125	45	36
B 1393	(X528-17 selfed)	53	3	6	265	193	73
B 1394	B 402-1 selfed	25	7	28	125	16	13
B 1396	B 881-12 selfed	32	11	34	160	30	19
B 3516	Ac.25841 x(X528-170)	16	45	94	80	57	71
Family lines total		587	303	521	2935	1300	44
Breeding material		15	8	633	18	57	24
Check Houma		12	4	33	60	8	13
Katahdin		12	8	67	60	17	28
Pungo		12	10	83	60	35	58

Judging from the wilt infection on the checks the general level of infection was lower than that for 1953, and the 1953 infection was less severe than that for 1952. This was in spite of the fact that each year the vines and refuse from the wilted plants were left on the ground. The results are contrary to the common opinion that if potatoes are grown continuously on the same soil wilt will increase in severity.

Twenty-one varieties were grown at Caribou, Maine, in soil infested with organisms that incite verticillium wilt. A few named and numbered varieties Houma, Ontario, Russet Burbank, S 41956, B 579-3, X792-88, X792-94, and B 920-7 showed less than 10% infection. However, as in former tests, there was little or no correlation between percentage infection and yield. Ontario, with 4% wilt, yielded 525 bushels U.S. No. 1 potatoes per acre but Saco yielded 585 bushels per acre in spite of 55% wilt. The data for this test are given in P. I. table 11.

P. I. table 11. Reaction to verticillium wilt as reflected in yields and percentage solids of 21 varieties of potato grown in wilt-infested soil on the Ashby Farm, Caribou, Maine, 1954.

Variety name or number	Wilt	U.S. No. 1 yield per acre		Solids
		Bu.	Pct.	Pct.
Delus	76	332	93	17.7
Houma	8	385	87	17.5
Irish Cobbler	34	382	87	16.9
Katahdin	26	402	90	18.2
Manota	36	403	82	16.7
Merrimack	58	436	93	19.7
Ontario	4	525	88	17.2
Pontiac	34	531	93	16.3
Russet Burbank	9	235	64	19.2
Saco	55	585	91	19.2
Sebago	34	380	85	17.9
41956	8	320	71	18.9
B 355-35	48	499	94	18.2
B 579-3	8	330	83	18.4
B 606-37	46	517	94	19.1
X792-88	6	237	63	17.9
X792-94	6	272	68	19.9
(NC)B 880-4	40	481	91	16.9
B 920-7	2	324	78	16.5
B 922-6	58	247	79	17.3
B 2368-4	29	572	98	17.7
L.S.D. at 5% level		69.2		.7

Scab Resistance

On the Aroostook Farm, Maine, 669 selections from 33 family lines were grown on scab-infested soil. Of these, 230 showed less than 1% of the surface covered with scab pustules. All of the Green Mountain checks showed a much higher infection. About 30% of the seedlings showed small superficial pustules, but all of the Green Mountain checks produced large rough pustules. A summary of the data for these tests are given in P. I. table 12.

P. I. table 12. Summary of the data observed from the scab tests on Aroostook Farm, Presque Isle, Maine, 1954.

Material tested		Surface area covered 1/				Type of pustules 2/		
		T	1	2	3	1	2	3
	No.							
Seedling varieties	669	230	333	103	3	202	198	269
Gr. Mountain check	669		72	493	104			669

1/ Surface area covered	2/ Type of pustule
T = Less than 1%	1 = Small, superficial
1 = 1 to 20%	2 = Large but still superficial
2 = 21 to 40%	3 = Large rough pustules.
3 = 41 to 60%	

In 1954 the amount of material to be tested for scab resistance could not all be planted in the field in which the scab resistance tests are usually made. The uniform scab nursery that was sent to 8 State agricultural experiment stations was planted on a new field the soil of which was reported to be infested with scab organisms. A few pustules developed on some of the susceptible varieties, but most of the checks were so clean that the test was of no value.

The Maine potato variety trial for 1954 was located only on the Aroostook Farm so comparative results for the 28 varieties included in this field test will be lacking information usually available from at least 3 other locations within the State.

Thirteen named and 15 seedling varieties listed in P. I. table 13^{1/} were included in this planting. Seedling B751-119 came from Dr. D. Folsom's leaf roll material at Highmoore Farm and was the one considered the most promising of 3 tested a year ago. Seedlings B 766-a, B 911-21, B 911-31, B 931-19, and B 2395-30 are ring-rot-resistant selections from the ring rot material tested and increased by Dr. R. Bonde. The leaf-roll resistant seedlings selected from the leaf-roll tests by Dr. G. Simpson and Dr. R. Bonde are as follows: B 2091-12, B 2357-13, B 2938-17, and B 2952-1. The remaining varieties and seedlings came from the U.S.D.A. disease-resistance tests and increase plots on the farm.

^{1/} Maine yield test conducted cooperatively by R. V. Akeley, U.S.D.A., C. E. Cunningham, and K. F. Nielsen, Maine Experiment Station.

Approximately 1,240 pounds per acre of 8-16-16 fertilizer was applied to the soil in bands before planting. The varieties were planted in 30-foot plots with 34 inches between the rows and replicated 4 times. The seed placing was 8 inches for varieties except Russet Burbank, Menominee, and Merrimack which were planted 14, 10, and 10 inches, respectively. Tribasic copper with DDT emulsion in water at the rate of 100 gallons per acre was applied at weekly intervals with one spraying of Parathion included the last of July. The experiment was planted May 15, the vines were killed with an arsenical spray September 3, and harvesting was completed on September 10. The entire growing season was 111 days more or less, depending on the variety and its maturity.

Discussion of Yields and Total Solids

In P. I. table 13 the yield of tubers in bushels per acre over $1\frac{1}{2}$ inches in diameter for the 28 selections are given, as well as their percentage total solids, maturity, natural fertility, and main resistant factors. Even though the growing season was not considered normal because of excessive rains and cloudiness several varieties produced excellent yields, free of tuber rots and high in percentage solids. This was especially true for Saco, Kennebec, and Merrimack. They were significantly higher in yield and percentage solids than Katahdin and Russet Burbank. Also, as the table indicates, Saco, a new commercial variety, is immune to latent and mild mosaic and has not so far shown net necrosis symptoms due to seasonal leaf roll infection. Merrimack, another recently released variety, has mild mosaic and ring rot resistance. The new Delus variety was the highest in percentage solids and its yield was acceptable, 465 bushels per acre, for such an unfavorable season. It generally is considered medium in maturity and highly resistant to if not immune from the common races of late blight. Seedling B 73-10 produced a high yield of acceptable tubers and has commercial possibilities because of its range of adaptation and its scab and late blight resistance. Seedling B 595-76 is one of the best over-all parents available and its commercial performance compares favorably with the better varieties now grown in Maine. This seedling is immune to latent and mild mosaic, resistant to scab, late blight, verticillium wilt, corky ring spot, and also high in total solids. The leaf-roll-resistant selection B 2952-1 and the ring-rot resistant B 931-19 compare favorably with the standard Katahdin variety.

Solanum Species and Species Hybrids

R. W. Buck, Jr.

At Beltsville in 1954, 47 species and clones and 28 interspecific hybrids of the genus Solanum were grown for crossability and cytological investigations. Following controlled pollinations, seed was obtained from 29 self or intraspecific pollinations and from 198 interspecific pollinations.

P. I. table 13. Maine potato variety trial for 1954. Yields in bushels per acre above 1½ inch diameter.

Variety	Parentage	minimum 1½ in. per A.	Solids Pct.	Mat- urity	Fert- ility	color skin	Notes on solids and resistance to diseases
Canso	Canadian variety	476	19.1	L	-	W	Late blight
Cherokee	(X96-56)x(X528-170)	509	19.5	M	-	W	Late blight, scab, high solids
Delus	Mohawk x (X96-56)	465	21.1✓	L	0	W	Late blight, high solids
Early Gem	Rus. Burbank x(X96-56)	371	17.2	E	0	Rus	Scab resistance
Gr. Mountain	----	462	20.6	L	0	W	High solids
Houma	Chas. Downing x Katahdin	465	18.6	L	0	W	A virus & leaf roll
Katahdin	40568 x 24642	400	18.2	L	✓	W	" " " " & net necrosis
Kennebec	B127 x (X96-56)	603	20.1	L	0	W	Late blight, A virus & net necrosis
Keswick	Canadian variety	473	19.6	L	0	W	Late blight
Merrimack	(X96-56) x Saranac	491	20.8	L	+	W	Late blight, ring rot & A virus
Pungo	(X96-44)x(X528-170)	573	19.1	L	0	W	Late blight & high solids
R. Burbank	-----	399	19.6	L	0	Rus	High solids
Saco	41956 x (X96-56)	643	20.1	L	0	W	Immune to viruses X & A, res. to net necrosis & high solids.
B 73-10	Mohawk x (X96-56)	606	18.4	L	0	W	Late blight & scab.
B 355-35	(X96-56) x Saranac	567	19.1	L	+	W	" " & ring rot
B 595-76	41956 x Cherokee	461	20.6	M	0	W	Immune to viruses X & A res. to scab, late blight & V. wilt.
B 751-119	B 24-58 x Teton	357	19.4	M	0	W	Leaf roll (Folsom)
B 766-a	(X157-9) x Teton	403	16.7	L	0	W	Ring rot (Bonde)
B 911-21	055 x Teton	462	17.4	E	✓	W	" " "
B 911-31	" "	396	17.6	L	+	W	" " "
B 920-7	B 401-3 x B 355-24	460	17.6	E	0	W	Late blight & scab
B 931-19	B 355-24 x(X792-94)	447	18.6	L	+	W	Ring rot (Bonde)
B 962-3	B 81-40 x(X245-186)	432	19.7	M	0	W	Late blight & scab
B 2091-12	Houma x B 522-33	436	16.9	L	0	W	Leaf roll (Bonde & Simpson)
B 2357-13	B 583-66 x B 584-11	456	16.7✓	M	0	W	" " "
B 2395-30	B 607-72 x B 606-3	360	17.2	E	+	W	Ring rot (Bonde)
B 2938-17	B 355-44 x B 522-33	359	18.0	E	✓	W	Leaf roll (Bonde & Simpson)
B 2952-1	B 514-14 x Katahdin	471	18.2	L	0	W	" " (Bonde)
L.S.D. 5% level		77	.9				

Seed was obtained from 59 pollinations involving interspecific hybrids. Many interspecific pollinations resulted in only a few seed.

Many diploid species were found to be self-incompatible. However, these produced abundant seed from intraspecific and certain interspecific pollinations. The reciprocals of certain successful crosses failed, indicating a one way compatability.

The meiotic behavior of the chromosomes was studied in the pollen mother cells of a total of 62 plants. These represented 28 species and 16 interspecific hybrids.

The expanded program dealing with species and species hybrids was made possible through the generosity of Dr. Carl O. Erlanson, Head of Section of Plant Introduction, who transferred enough funds to the Section of Vegetable Crops to permit hiring a part-time assistant.

Late Blight Resistance

R. E. Webb, E. S. Schultz, R. V. Akeley, F. J. Stevenson
R. W. Buck, and L. C. Cash

Twelve varieties, 19 seedling varieties, 4 accessions and 1,251 selections, representing 83 selfed and parental combinations, were tested for their resistance to the common race of late blight. One tuber of each variety and selection was planted in 3-inch pots in the greenhouse. When the plants were 3-5 inches tall they were transferred to the moist chamber and inoculated with zoospore-suspension of the late blight fungus. Two tubers of each variety and selection were planted in the field for a similar test under field conditions. Each third row was planted to Green Mountain which served as the susceptible control. Inoculations similar to those in the greenhouse were made when the plants were 12-14 inches tall.

Cool, cloudy weather with frequent intermittent showers, prevailed throughout the growing season. These conditions were ideal for the initial infection and provided for a continual supply of secondary inoculation in the field.

P.I. table 14 shows the reaction of the varieties and seedling varieties to infection with the common race of late blight 3 weeks after inoculation in the greenhouse and in the field (greenhouse 8/7). After the initial readings were made, notes were taken at various intervals for the remainder of the season to determine the relative resistance of varieties and selections immune or highly resistant to the common race under what probably is considered the most favorable conditions for a blight epidemic ever to occur in a potato-growing area. Varieties and selections that were immune to the common race of the fungus did not show blight lesions until during the fourth week after inoculation (P.I. table 14). Plants of most of these varieties and selections succumbed fairly rapidly after the initial appearance of sporulating lesions.

P.I. table 14. Reaction of varieties, seedling varieties, and 4 accessions to late blight in the greenhouse and field, 1954.

Variety	Greenhouse ^{1/}			Field (dates) ^{2/}		
	6/3	8/7	8/14	8/22	9/2	9/14
Mohawk	5 ^{3/}	5	6			
Katahdin	5	5	6			
Teton	5	6				
Pontiac	5	5	6			
Irish Cobbler	5	6				
Earlaine	5	6				
Menominee	4	5	6			
Saranac	2	5	6			
Friso	2	3	6			
Saco	1	1	2	5	6	
Cherokee	1	1	2	5	6	
Kennebec	1	1	2	4	6	
X96-56	1	1	2	5	6	
X528-170	2	5	6			
Ac. 25828	1	1	1	1	2	2
" 25830	5	6				
25832	1	1	1	2	3	5
25892	1	1	2	4	6	
B 478-1	1	1	2	3	5	6
B 607-56	1	1	2	3	5	6
B 402-1	5	6				
B 779-1	1	1	2	5	6	
B 922-3	Nec. reac.	1	1	1	(dead, early blight)	
B 922-6	1	1	1	1	1	1
B 922-18	1	1	1	1	1	1
B 922-21	1	1	1	1	1	1
B 936-12	5	6				
B 1270-19	1	1	2	6		
3 XE-1	1	1	1	1	1	1
3 VW-9	1	1	1	1	1	1
3 NC-9	1	1	1	1	1	1
B 595-76	1	1	2	5	6	
B 606-37	1	1	2	5	6	
B 355-44	1	1	2	5	5	6

1/ Inoculated 5/26 (common race)

2/ " 7/15 "

3/ Grading system given in table 15.

Two accessions showed a relatively high level of resistance to blight and did not become infected until late in the season. Seven seedling varieties did not contract the disease (P.I. table 14) and apparently were immune to the physiologic races of blight which were present in the test.

P.I. table 15 summarizes the results of the varietal and selection blight-exposure trials in the greenhouse and for the entire season in the field. The reaction of the clonal lines to the common race of blight in the greenhouse compared very favorably with that in the field (P.I. table 15-8/7).

Under field conditions 55.4% of the varieties and selections were immune or highly resistant to the common race of blight. Apparently, more virulent races of blight appeared during the fourth week after inoculation with the common race. Of the 738 clonal lines immune from or highly resistant to the common race, 50 showed moderate to severe infection within 1 week. Two weeks later only 168 selections were immune or showed a high degree of resistance. At the end of the season (8 weeks after the initial inoculations) 117 selections showed a measurable degree of resistance. Of these, 48 were immune and 28 showed moderate to a high degree of resistance to the physiologic races which appeared late in the season.

Isolates of the blight fungus were collected during the season from plants showing different levels of resistance. These are being inoculated to detached leaves of the differential hosts for identification of the physiologic races.

P. I. table 15. Summary of late blight resistance test, 1954. Clonal response in the greenhouse and at intervals during the season in the field.

Classes	Greenhouse date 6/3	Field (dates)				
		8/7	8/14	8/22	9/2	9/14
Nec reac.	179	200	1	0	0	0
1	564	509	240	114	107	48
2	24	29	444	54	16	7
3	29	5	40	64	19	11
4	122	24	10	134	31	10
5	354	139	2	211	88	41
6	5	370	170	160	316	144

Inoculum - Common race of blight

Applied - Greenhouse May 26; field July 15-17.

Classes

Nec. reac. - Hypersensitive - lesions, not sporulating

1. No lesions
2. Occasional leaf showing lesions
3. 1/2 leaves " "
4. 2/3 " " "
5. All but a few leaves dead.
6. All leaves dead.

P. I. table 16 summarizes the blight resistant test for 1954. Selfed lines and parental combinations are given with the number of selections in each progeny tested. P. I. table 16 also shows the number of selections resistant to the common race of blight, the number surviving at the end of the season, and the percentage of the progenies resistant to the common race and the percentage immune or showing a degree of resistance the day before frost killed the vines at the end of the season.

It is apparent from the data presented that over 50% of the progenies of selected parental combinations may be expected to be immune from the common race of late blight. Most of these parents are resistant or immune to other important diseases, such as viruses A, X, and leaf roll, scab, and verticillium wilt, and possess desirable commercial horticultural characteristics. It is of especial interest to note that these parents also produce progenies some of which remained free of infection with blight under prolonged conditions very favorable for the expression of the maximum potential physiological variability of the organism.

P. I. table 16. Summary of late blight resistance test, 1954. Response of selections under field conditions

Parentage	Selections inoculated	Response to common race		Final inoculation		Resistant to:	
		8/7		9/14		Common race	Unidentified races
	No.	Res.	Sus.	Res.	Sus.	Pct.	Pct.
B 24-58 x 922-3	5	0	5	0	5	0.0	0.0
B 922-3 x Menominee	25	13	12	6	19	52.0	24.0
B 922-3 x Saranac	25	11	14	2	23	44.0	8.0
B 922-3 x B 929-32	19	13	6	4	15	68.4	21.1
B 922-3 x B 936-12	14	6	8	1	13	42.9	7.1
B 779-1 x B 922-3	5	3	2	1	4	60.0	20.0
B 922-18 x (X528-170)	3	3	0	2	1	100.0	66.3
B 922-18 x B 929-32	35	32	3	6	29	91.4	17.1
B 927-21 x B 929-32	42	34	8	1	41	81.0	2.4
Kennebec x Katahdin	29	12	17	0	29	41.4	.0
" x Menominee	35	12	23	0	35	34.3	.0
" x B 936-12	40	18	22	0	40	45.0	.0
" x B 864-12	11	5	6	0	11	45.5	.0
" x B 929-32	20	17	3	0	20	85.0	.0
" x B 881-12	67	39	28	0	67	58.2	.0
Menominee x B 2429-138	19	0	19	0	19	.0	.0
" x (X528-170)	7	3	4	0	7	42.9	.0
" x Saranac	8	0	8	0	8	.0	.0
" x B 881-12	27	0	27	0	27	.0	.0
Mohawk x (X528-170)	6	0	6	0	6	.0	.0
B 402-1 x Menominee	5	0	5	0	5	.0	.0
B 595-76 x B 936-12	38	28	10	0	38	73.7	.0
B 595-76 x (X528-170)	6	4	2	0	6	66.7	.0
" x B 864-2	29	24	5	0	29	82.8	.0
" x Earlsaine	46	36	10	0	46	78.3	.0

P. I. table 16 continued

Parentage	Selections inoculated	Response to common race		Final inoculation		Resistant to:	
		8/7		9/14		Common race	Unidentified race
	No.	Res.	Sus.	Res.	Sus.	Pct.	Pct.
B 606-37 x B 929-32	57	43	14	0	57	75.4	0.0
" x Menominee	27	10	17	0	27	37.0	.0
B 606-67 x B 929-32	31	20	11	0	31	64.5	.0
" x Earlane	25	12	13	0	25	48.0	.0
B 779-1 x Menominee	10	3	7	0	25	30.0	.0
Friso x B 355-44	14	3	11	3	11	21.4	21.4
B 478-1 x B 355-44	5	3	2	1	4	60.0	20.0
Ac. 25830 x Katahdin	9	0	9	0	9	.0	.0
" 25786 x (X528-170)	29	9	20	0	29	31.0	.0
" 25830 x B 2067-52	29	0	29	0	29	.0	.0
" 25892 x Katahdin	14	5	9	0	14	35.7	.0
" 25933 x "	20	20	0	12	8	100.0	60.0
" 25934 x "	6	0	6	0	6	.0	.0
(Flava x Robusta) x Menominee	14	4	10	0	14	28.6	.0
B 2368-17 x Cherokee	3	1	2	0	3	33.3	.0
B 1270-19 x Dyk 2773	4	2	2	0	4	50.0	.0
B 2337-7 x Dyk. 2778	3	0	3	0	3	.0	.0
Dyk. 2773 x B 929-32	9	3	6	0	9	33.3	.0
" 2778 x "	11	8	3	0	11	72.7	.0
Earlane x "	42	24	18	0	42	57.1	.0
Akabia x "	31	14	17	1	30	45.1	3.2
I. Cobbler x Cherokee	57	26	31	4	53	45.6	7.0
Cherokee (selfed)	32	27	5	4	28	84.3	12.5
Ac. 25830 x B 2429-92	19	0	19	0	19	.0	.0
B 595-76 x B 24-58	20	12	8	0	20	60.0	.0
B 606-37 x B 24-58	14	12	2	1	13	85.7	7.1
G.L.B.-1 x B 929-32	2	2	0	0	2	100.0	.0
B 922-6 x B 2968-32	3	3	0	3	0	100.0	100.0
B 926-6 x Teton	2	2	0	1	1	100.0	50.0
B 922-18 x B 929-32	2	2	0	0	2	100.0	.0
3 NC-9 x B 929-32	1	1	0	1	0	100.0	100.0
3 NC-9 x B 922-3	5	5	0	3	2	100.0	60.0
3 XE-1 x B 929-32	13	12	1	3	10	92.3	23.1
Ac. 25949 x Katahdin	23	23	0	3	20	100.0	13.0
" " x B 922-3	3	3	0	3	0	100.0	100.0
" 25956 x "	1	1	0	0	1	100.0	.0
HIM-1 x Saranac	1	1	0	1	0	100.0	100.0
Ac. 25891 x (X528-170)	16	16	0	9	7	100.0	56.3
" 25828 x B 929-32	2	2	0	1	1	100.0	50.0
" 28832 x "	4	4	0	3	1	100.0	75.0
" 25955 x Katahdin	6	6	0	0	6	100.0	.0
" 25960 x B 929-32	13	13	0	4	9	100.0	30.8
" " x Katahdin	3	3	0	1	2	100.0	33.3
" 25962 x B 929-32	1	1	0	0	1	100.0	.0

P. I. table 16. continued

Parentage	Selections inoculated	Response to common race		Final inoculation		Resistant to:	
		8/7		9/14		common race	Unidentified race
	No.	Res.	Sus.	Res.	Sus.	Pct.	Pct.
(X96-56) x HLT-4	5	5	0	4	1	100.0	80.0
B 595-76 x B 922-3	1	1	0	0	1	100.0	.0
Ac. 25904 x B 607-56	5	5	0	3	2	100.0	60.0
" " x B 922-3	1	1	0	0	1	100.0	.0
HJK-2 x Katahdin	1	1	0	1	0	100.0	100.0
HLD-1 x B 929-32	2	2	0	1	1	100.0	50.0
3 VW-9 x B 2968-31	3	3	0	2	1	100.0	66.6
Ac. 25949 selfed	7	7	0	4	3	100.0	57.1
" 25891 "	9	9	0	6	3	100.0	66.6
" 25904 "	4	4	0	4	0	100.0	100.0
" 25953 "	1	1	0	0	1	100.0	.0
" 25955 "	1	1	0	0	1	100.0	.0
3 VW -9 "	7	7	0	1	6	100.0	14.3
B 606-72 x B 606-3	1	0	1	0	1	0.0	.0

Resistance to Brown Rot
R. E. Webb, R. V. Akeley and F. J. Stevenson

Eighteen varieties and 189 selections of 89 parental combinations were included in the brown rot resistance test. Ten freshly-cut seedpieces of each variety and selection were momentarily immersed in a water-suspension of the organism and planted immediately. The plot was planted April 14 and harvested July 13. Weather conditions during the growing period were hot and dry. An average tuber sample of 41 tubers were cut after a short storage period to determine a disease index for each variety and selection. A heavy infestation of the corn-ear worm during June made it impossible to determine the number of plants showing wilt due to the organism.

P. I. table 17 gives the varieties and percentage of tubers of each showing symptoms of brown rot. The average disease index for the 207 varieties and selections was 21.9. The highest disease index was 71.4. Two varieties and 39 selections had less than 10% of the tubers showing symptoms. Tubers of 3 varieties and 7 selections did not show symptoms of the disease.

Promising selections and several varieties will be included in replicated trials in 1955.

P.I. table 17. Varietal susceptibility to brown rot.

<u>Varieties</u>	<u>Disease index</u>
Irish Cobbler	31.3
Early Gem	.0
Earlaine	42.4
Green Mountain	42.9
Houma	5.6
Katahdin	23.8
Kennebec	37.9
Marygold	4.8
Pontiac	15.2
Pungo	13.6
Red Warba	50.0
Russet Burbank	29.7
Saco	.0
Sebago	25.0
Sequoia	.0
Triumph	29.6
White Rose	57.9

Reaction of Some Solanum Species to Virus Y and Verticillium albo-atrum
R. E. Webb and R. W. Buck

Tubers of the Solanum species shown in P.I. table 18 were obtained from R. W. Hougas of the Inter-Regional Potato Introduction Station. Tubers of the interspecific hybrids were grown by R. W. Buck at Beltsville, Md.

Virus Y

Three plants of each species and hybrids were sap-inoculated with a moderately virulent strain of virus Y when the plants were 3-4 inches tall. Of the 30 species and hybrids tested, plants of 24 gave typical current-season symptoms of virus Y infection. The inoculation period of the viruses and severity of symptoms induced varied widely in plants between the species and hybrids. Plants of 3 species and 3 hybrids initially developed local lesions on the inoculated leaves. This symptom was followed by top-necrosis in plants of the 2 species and 2 hybrids, and a typical mottle in plants of 1 species and 1 hybrid. One species, *S. schickii*, Plant Introd. No. 189219 proved to be a symptomless carrier of virus Y.

Verticillium albo-atrum.

Young plants of 21 species and 6 interspecific hybrids were inoculated with the verticillium wilt organism. The roots were immersed momentarily in a spore- and mycelium- suspension of a 14-day-old culture and transplanted to 4-inch pots. Symptoms of wilt in plants of the susceptible

P. I. table 18. Reaction of some *Solanum* species and interspecific hybrids to virus Y and Verticillium albo-atrum.

Species or hybrid	Plant Introd. No.	Reaction to:			
		Virus Y	Verticillium albo-atrum		
			Plants inoc.	plants infected	Comments
			No.	No.	
<i>S. ajuscoense</i>	186555	S			
<i>S. antipoviczii</i>	195164	S	4	4	
<i>S. boergeri</i>	133656	S	4	4	
<i>S. boreale</i>	186545	S	4	4	
<i>S. demissum</i>	160227	S LL(TN)	4	4	
"	161164	S	4	4	
"	175404	S			
<i>S. gibberulosum</i>	189215	S	8	4	Tolerant
<i>S. gigantophyllum</i>	195185	S LL(mottle)	1	1	
<i>S. guerreroense</i>	161730		3	3	
<i>S. longipedicellatum</i>	186557	S (mild chlorosis)	4	4	
<i>S. macolae</i>	175434	S	4	0	To be retested
<i>S. malinchense</i>	195167	S	4	4	
<i>S. parodii</i>	133708		4	0	To be retested
<i>S. phureja</i>			4	4	
<i>S. pinnatisectum</i> var					
heptazygam	186554	S LL(TN)	4	4	
<i>S. saltense</i>	189217	S	4	4	
<i>S. sambucinum</i>	184762	S	2	2	
<i>S. schickii</i>	189219	S carrier	4	0	To be retested
<i>S. stoloniferum</i>	161158	S	4	4	
"	161171	S	4	4	
<i>S. tlaxcalense</i>	195169	S			
<i>S. verrucosum</i> var.					
spectabiles	161726		3	3	
<i>S. verrucosum</i>	160228		4	4	
<i>S. jamesii</i>	195189		4	4	
<i>S. fendleri</i>	186559		2	2	
"	186560		5	5	
<i>S. chacoense</i>	BW1-1	S	2	2	Tolerant
"	BW1-2		2	2	Tolerant
"	BW1-4	S	6	6	
<i>S. caldasii</i> x <i>S. com-</i>					
mersonii(Brazil)	BW2-1	S	4	4	Tolerant
"	BW2-3	S	3	3	Tolerant
<i>S. commersonii</i> x <i>S.</i>					
commersonii	BW3-1	S	2	2	

P. I. table 18 continued

Species or hybrid	Plant Introd.	Virus Y	Reaction to:		
			Verticillium albo-atrum		Comments
			Plants inoc.	Plants infected	
(S. caldasii x Katahdin)	BW4-1	S LL(TN)	No. 4	No. 0	To be retested
(S. demissum x S. acaule)	BW5-1	S LL(mottle)	4	4	
(S. acaule x S. commersonii)	BW6-1	S	2	2	
(S. chacoense x Menominee)	BW7-1	S	2	2	Tolerant
"	BW7-2	S	4	4	Tolerant
(S. macolae x S. simplicifolium)	BW8-1	S LL(TN)			

species and hybrids were typical of those induced in commercial varieties of S. tuberosum. Wilting of the lower leaves appeared 29-35 days after inoculation in plants of 18 species and 5 hybrids. Plants of 2 species and 4 selections of 2 hybrids showed a high degree of tolerance to the organism. Wilting in these plants was restricted to the lower 3-5 leaves. Plants of species S. parodii, S. macolae, S. schickii, and hybrid S. caldasii x Katahdin failed to become infected with the organism. These species will be retested for their tolerance to verticillium.

The search for resistance to virus Y and Verticillium albo-atrum is being continued with special reference to the many selections of S. demissum.

Virus A Resistance

E. S. Schultz, R. E. Webb, R. V. Akeley and F. J. Stevenson

Four hundred sixty four seedling potato varieties, representing 14 crosses and 3 selfed varieties, were exposed to virus A infection in the field where viruliferous aphids, Myzus persicae, were deposited onto the tops of every hill before blossoming. The Green Mountain variety served as a virus-A-susceptible control. Each variety was represented by 5 hills. Since most of the inoculated varieties fail to manifest current-season symptoms, tuber samples, 1 tuber per hill, were harvested for grafts onto Green Mountain in the greenhouse for detection of the virus-A susceptibles.

Observations on the reaction of the seedling potato varieties disclosed that 10 to 68% of the seedling potato varieties contracted virus A (P.I. table 19), that the virus-A-susceptible varieties varied in symptomatology; viz., faintly mottled, light green, light green and rugose, and mottled and rugose, and

no apparent symptoms. Inasmuch as every hill in the Green Mountain controls contracted virus A, it is apparent that many of the seedling potato varieties are more field-resistant to virus A than Green Mountain.

P. I. table 19. Seedling potato varieties exposed to mild mosaic Green Mountain in the field were viruliferous *Myzus persicae* 100 + aphids were deposited on every seedling potato hill when plants were 4 to 8 inches high. Presque Isle, Maine, 1953. Inarch grafted to healthy Green Mountain (OEHS 8-14-52) Beltsville greenhouse, January 1954.

Pedigree	Parentage	No. var.	Reaction of varieties to:	
			Virus A	Other diseases
			% infected	%
Katahdin	40568 x 24642	1 ^{1/}	0	TN ^{2/}
Teton	45146 x Earlane	1	20	TN
Earlaine 3	I. Cobbler x 43055	1	0	
Craig's Snowdrift	Ac. 25824	1	20	TN
1253-A(12)	" 25826	1	0	TN
Craig's Royal	" 25827	1	20	TN
834-C (29)	" 25831	1	0	TN
Kerkov Kidney	" 25833	1	60	TN
Keswick (F 431)	Canada bl. res.	1	40	TN
B 402-1	(X499-a) x (X528-349)	1	40	TN
B 884-19	(X792-88) x (X157-9)	1	60	
B 926-9	B 66-1 x (X792-94)	1	40	
B 936-12	(X792-94) x B 294-38	1	40	
B 982-8	Chippewa x (X792-94)	1	0	
B 982-23	"	1	20	
B 983-5	(X792-88) x (X792-94)	1	0	
B 985-11	Mohawk x (X792-94)	1	60	
B 991-3	B 355-24 x B 81-40	1	60	
Ac 25828	Aust. sdlg. x bl. res.sdlg.	1	0	
Ac 25830	" x Gladstone	1	0	
Cherokee	(X96-56) x (X528-170)	1	0	TN
B 606-67	41956 x (X96-56)	1	0	
Kennebec	B 127 x (X96-56)	1	0	
B 920-7	B 401-3 x B 355-24	1	20	
B 922-3	TI5 x B 355-24	1	40	TN
B 3256-1	Aquila x Kennebec	1	0	TN
B 3256-2	"	1	40	TN
B 3260	Ac 25828 x B 922-3	9	66	TN 33
B 3262	" 25830 x B 922-3	2	100	
B 3310	B 881-2 x B 402-1	30	66	LR ^{3/} 13
B 3312	Houma x Ac 25673	5	40	TN 20
B 3324	B 606-67 x Earlane	13	15	
B 3325	" x Katahdin	2	0	TN 100
B 3326	B 606-37 x B 936-12	12	16	LR 50
B 3328	B 985-11 x B 991-3	12	25	LR 50

P. I. table 19 continued

Pedigree	Parentage	No. var.	Reaction of varieties to:	
			Virus A	Other diseases
			% infected	%
B 3330	B 606-67 x Earlane	18 ^{1/}	11	LR ^{3/} 72
B 3332	B 884-19 x B 936-12	11	10	LR 91
B 3333	B 926-9 x B 929-32	14	13	TN 57
B 3338	B 982-16 x Katahdin	22	41	TN 18
B 3339	Ac 25830 x Katahdin	31	68	TN 35
B 3356	B 721 x Teton	77	13	TN 80
B 1359	B 881-12 selfed	99	34	LR 30
B 1364	Earlaine selfed	81	24	LR 43
B 1365	Cherokee selfed	24	41	

^{1/} 5 hills of each variety or selection sampled

^{2/} TN = Top necrosis caused by virus X

^{3/} LR = Leaf roll

The results from the reaction of seedling potato varieties to virus A indicate that many varieties are highly virus-A-resistant, that the virus A resistance is heritable, that virus-A-immune parents are not homozygous for this immunity, and that some virus-A-immune varieties also can harbor high resistance to X, Y, and leaf roll viruses and late blight, common scab, and ring rot.

Virus X Resistance

E. S. Schultz, R. E. Webb, R. V. Akeley and F. J. Stevenson

During 1953 plants of 9 varieties, 20 seedling varieties, and 426 selections, representing 23 parental combinations, were inoculated with the virulent strain of virus X. Plants of those selections which failed to become infected by mechanical inoculation were grafted to Green Mountain plants carrying a weak X. Aerial tubers were formed on the scions of immune plants. P. I. table 20 summarizes the 1953 inoculation and graft tests. Of the 455 varieties and selections tested, 46.8% showed immunity to virus X.

P. I. table 21 summarizes the 1954 test. Two plants of each of 4 varieties, 6 seedling varieties, and 424 selections of 19 parental combinations were inoculated with the virulent strains of virus X. Of the 434 varieties and selections inoculated, 41.2% failed to become infected with virus X. The more promising selections will be grafted to Green Mountain plants for the aerial tuber (immune) reaction.

P. I. table 20. Summary of virus X resistance. Beltsville, 1954.

Pedigree or variety	Parentage	No. of varieties	Reaction of varieties		
			Virus X immune	Virus X infected from leaf rubbing	X immune
			No.	No.	Pct.
Katahdin	40568 x 24642	1		1	
Earlaine	I. Cobbler x 43055	1	Ng ¹ /	0	
41956	G.S. 9-1 x 24642	1	1	0	
Carl Ross	Ac. 25673 Germ.	1		1	
Craigs Snowdrift	" 25824	1	1	0	
1253-2 (12)	" 25826	1	1	0	
834-C (29)	" 25831	1		1	
Craigs Royal	" 25831	1		1	
Kerkov Kidney	" 25833	1		1	
Essex	Reddick N. Y.	1	Ng ¹ /	0	
Canso (F391)	Canada bl. res.	1		1	
Keswick (F431)	" " "	1		1	
B 355-24	(X96-56) x Saranac	1		1	
B 606-3	41956 x (X96-56)	1	1	0	
B 778-43	(X792-88) x Cherokee	1	1	0	
B 779-1	" x (X96-56)	1	1	0	
B 884-19	" x (X157-9)	1	1	0	
B 922-6	TI5 x B 355-24	1		1	
B 922-12	"	1		1	
B 922-21	"	1		1	
B 926-9	B 66-1 x (X792-94)	1		1	
B 931-2	B 355-24 x "	1	1	0	
B 936-12	(X792-94) x B 294-38	1	1	0	
B 355-44	(X96-56) x Saranac	1		1	
B 606-67	41956 x (X96-56)	1		0	
B 919-15	B 355-24 x (X792-94)	1	1	0	
B 922-3	TI5 x B 355-24	1		1	
B 3235-1	Essex x 606-3	18	12	6	66
B 3239	B 355-24 x B 919-15	10	4	6	40
B 3243	B 778-43 x B 922-3	4	2	2	50
B 3246	B 922-4 x B 606-3	2	2	0	100
B 3249	B 922-8 x B 778-43	8	7	1	88
B 3250	B 922-8 x B 919-15	3	3	0	100
B 3251	B 922-12 x B 919-15	1	1	0	100
B 3253	B 931-2 x B 922-4	1		1	0
B 3298	B 936-12 x B 2067-52	82	43	39	52
B 3309	B 874-108 x B 2131-3	11		1	0
B 3316	41958 x Earlaine	37	19	18	51
B 3318	(B 936-12 x Ac 25673	8	1	7	13
B 3319	B 936-12 x Menominee	35	12	23	34
B 3320	B 922-3 x Menominee	36		36	46

P. I. table 20 continued.

Pedigree or variety	Parentage	No. of varieties	Reaction of varieties		
			Virus X immune	Virus X infected from leaf rubbing	X immune
			No.	No.	Pct.
B 3324	B 606-67 x Earlane	13	6	7	46
B 3325	" x Katahdin	2		2	
B 3326	B 606-37 x B 936-12	12	11	1	91
B 3328	B 985-11 x B 991-3	12	2	14	17
B 3330	B 606-67 x Earlane	18	7	11	39
B 3331	B 779-1 x B 936-12	17	13	4	77
B 3332	B 884-19 x B 936-12	11	9	2	82
B 3333	B 926-9 x B 929-32	14		14	
B 3362	B 355-44 x B 606-67	3	1	2	33
B 1355	B 936-12 selfed	68	51	17	76

1/ Ng = Not grafted

P. I. table 21. Summary of virus X resistance for 1954.

Pedigree or variety	Parentage	Selections:		
		Inoculated	Resistant	
		No.	No.	Pct.
Katahdin	40568 x 24642	1		
Earlaine	I. Cobbler x 43055	1		
Menominee	R. Jubel x 44537	1		
Kennebec	B 127 x (X96-56)	1		
Saco	41956 x Cherokee	1	1	
X528-170	R. Jubel x 44537	1	1	
B 606-37	41956 x (X96-56)	1	1	
B 779-1	(X792-88) x (X96-56)	1	1	
B 922-3	TI5 x B 355-24	1		
B 929-32	(X792-88) x B 81-40	1	1	
B 936-12	(X792-94) x B 294-38	1	1	
B 3395	B 864-2 x B 936-12	20	14	70.0
B 3398	Ac. 25813 x B 864-2	1	0	.0
B 3399	" x B 2113-9	5	0	.0
B 3304	B 922-3 x B 936-12	14	10	71.4
B 3305	B 779-1 x B 922-3	5	2	40.0
B 3411	Kennebec x B 936-12	40	12	30.0
B 3424	B 595-76 x B 936-12	38	16	42.1

P. I. table 21 continued.

Pedigree or variety	Parentage	Selections		
		Inoculated	Resistant	
		No.	No.	Pct.
B 3425	B 595-76 x (X528-170)	29	13	44.8
B 3427	B 595-76 x Earlane	46	18	39.1
B 3428	B 606-37 x B 929-32	57	24	42.1
B 3429	B 606-37 x Menominee	27	10	37.0
B 3430	B 606-67 x B 929-32	31	9	29.0
B 3431	B 606-67 x Earlane	25	12	48.0
B 3434	B 779-1 x Menominee	10	3	30.0
B 3441	B 478-1 x B 606-67	5	1	20.0
B 3473	Earlaine x B 936-12	32	13	40.6
B 3486	B 595-76 x B 24-58	20	10	50.0
B 3488	B 606-37 x B 24-58	14	5	35.7

An analysis of the data presented in tables 20 and 21 shows that almost 50% of the selections from selected parental combinations are immune to virus. X. All of the parents are immune or highly resistant to one or more diseases, such as virus A, leaf roll, scab, one or more races of late blight, ring rot, and verticillium wilt.

Varietal Reaction to Net Necrosis R. V. Akeley and F. J. Stevenson

Sixteen varieties were tested for their reaction to net necrosis in 1954. The varieties were planted in 20-hill rows in 4 randomized blocks. All plots were planted adjacent to rows of the Katahdin variety which was 100% infected with chronic leaf roll virus. Viruliferous aphids were transplanted to the leaf roll Katahdin on July 30 to insure an adequate population. Approximately 3 tubers from each hill were saved and stored at a temperature conducive to the development of net necrosis symptoms. The tubers were examined on January 5, 1955 for net necrosis and stem end browning. In addition to the data on internal necrosis the yields and dry-matter content were determined on all varieties in this test.

P. I. table 22 gives the data on net necrosis, stem end browning, yield and percentage of U.S. No. 1 potatoes and percentage dry matter. Among the named varieties Early Gem, Houma, Katahdin, and Saco were free from net necrosis. Two out of 360 tubers of Sebago showed symptoms of net necrosis as did 4 out of 553 tubers of Russet Burbank. 8.84% of the tubers of the Green Mountain and 26.84% of the Delus tubers showed symptoms of the disease.

P. I. table 22. Data on net necrosis, stem end browning, yields^{1/} and percentage solids of 16 potato varieties tested for resistance to net necrosis at Presque Isle, Maine, 1954.

Variety	Tubers 2/ examined	Net necrosis	Stem end browning	Yield per acre	U.S. No. 1	Solids
	No.	Pct.	Pct.	Bu.	Pct.	Pct.
Delus	313	26.84	0.0	431	96	21.8
Early Gem	312	0.0	.0	353	87	17.8
Green Mountain	441	8.84	.45	522	89	22.4
Houma	508	.0	.0	525	88	19.7
Katahdin	426	.0	.0	447	88	19.7
Merrimack	386	.25	.0	434	90	20.7
Russet Burbank	553	.72	24.5	194	43	21.2
Saco	531	.0	.0	586	92	21.0
Sebago	360	.56	.0	391	82	20.3
B 73-10	416	5.05	.0	538	93	19.3
B 355-35	475	1.47	.0	506	89	19.8
B 595-76	486	.21	.0	477	85	21.4
B 929-7	373	30.03	.0	398	87	17.5
B 922-6	303	20.79	.0	384	89	19.4
B 926-9	496	.0	.0	487	89	18.3
B 2368-4	432	.0	.0	615	96	19.8
L.S.D. at 5%				65.6		.6
" 1%				87.5		.8

1/ Yields of U. S. No. 1 potatoes

2/ Samples taken from each of the 4 replications.

While Russet Burbank showed a very small percentage of net necrosis it did show 24.05% of stem end browning. The only other variety showing stem end browning was Green Mountain and that in only .45% of the samples examined.

The yield data are also interesting. Among the 16 varieties tested Russet Burbank was by far the lowest yielder in the group with 194 bushels of U. S. No. 1 potatoes. Saco yielded about 3 times as much as Russet Burbank.

The percentage solids were relatively high in this test. If 19.7% is taken as the criterion for a baking potato 11 of the 16 varieties would qualify.

COLORADO (Fort Collins)

Lawrence A. Schaal, Cecil Frutchev and Charles McAnelly

These cooperative tests were conducted along the same lines as those of last season. Mr. Edmundson made all crosses, grew the first-year tubers, and the first 5 hills from all family lines at the Greeley Station. Approximately 700 5-hill lots were grown and 119 selections from last season's 5-hill lots were grown in the test plots at Eaton, Ault, and Gilcrest, Colo.

The Eaton plot consisted of varying amounts of the 119 selections made at the Greeley Station. The Gilcrest and Ault plots were grown primarily to obtain a scab reading on these selections, but considerable data on adaptability were obtained also. Several of the older selections were tuber-indexed and grown on the experimental farm at Monte Vista, Colo., primarily for seed increase. The older and more promising seedling selections were also grown in larger quantities at the Fort Collins test plot.

Part of the funds for the Eaton and Fort Collins test plots was furnished by the Area 3 P.M.A.

The FeCl_3 Test for Scab Resistance on First-Year Seedling Tubers

An attempt was made to demonstrate the value of the FeCl_3 test for scab resistance on first-year tubers from 11 family lines.

From 35 to 60 tubers from each family line were tested for presence of chlorogenic acid by placing a drop of 20 percent FeCl_3 on the surface of the small tubers and scratching the surface through the drop with a fine glass needle, injuring the tuber as little as possible.

Schaal table 1 shows the readings on these 11 lines as to reaction, using three groups of color reaction with FeCl_3 , (1) strong, (2) mild, and (3) weak. The number showing a given type of color reaction is similar to that to be expected if these same tubers were tested for scab resistance in scabby soil.

Each tuber was given a number and planted in scabby soil for a comparative scab test, but no data were obtained due to poor stand resulting from extreme drought conditions that existed in this plot.

Schaal table 1. Results of FeCl_3 test for scab resistance on tubers from 11 family lines.

Cross No.	Parentage	FeCl_3 reading			Total seedlings No.
		Strong	Medium	Weak	
1	B 776-2 x US 627-164	5	19	26	60
2	B 2969-13 x B 2922-263	3	14	18	35
4	US 627-164 x B 962-9	1	20	39	60
5	CS 1154 x US 627-164	2	29	14	45
7	Yampa x US 627-164	11	36	13	60
8	B 962-1 x US 627-164	12	33	15	60
11	B 2969-13 x B 2338-4	0	7	43	50
23	CS 10522 x US 627-164	0	17	33	50
24	B 598-29 x US 627-164	6	29	25	60
31	CS 9947 x CS 10585	0	23	37	50
38	CS 11011 x B 381-2	0	13	37	50

Scab Test Plots

The 119 selections included in the scab test plots at Gilcrest and Ault, Colo., represented 38 family lines, all of which resulted from crosses where scab resistance was considered in the selection of parent material. Scab infection was not heavy at either plot but sufficient to give a good reading. Of each selection 10 hills ^{were} grown along with 2 hills of Triumph for controls. Extreme drought conditions in the Ault, Colo., district prevented reliable adaptability readings, but more favorable conditions existed in the Gilcrest, Colo., test.

Only 4 selections, Nos. CS-12882, 12970, 13275, and 13333, were considered outstanding for scab resistance and adaptability in the Gilcrest plot. At the Ault plot selections CS-12234, 13249, and 13360 were considered outstanding where growing conditions were quite unfavorable. Although these plots are only 30 miles apart, they represent widely divergent types of soils and environmental factors. The Gilcrest section is of a sandy soil and is located in the early crop section. The Ault plot was in the late, heavy adobe type soil district. The past season was one of the driest in recent history, and irrigation was limited in the Ault plot. The Gilcrest section had sufficient irrigation water to mature a crop, but high summer temperatures were not conducive to a good crop of potatoes.

CS-13333 and 13360 were the only red seedlings showing promise in the scab test plots. These selections were grown in the Eaton, Colo., adaptability test plot. CS-13333 was considered desirable in the Eaton plot.

The Fort Collins, Colo., Test Plot. 1954

This plot was grown primarily for increase but also served as an adaptability test. Only comparative yield tests were run due to insufficient land and inadequate seed for a randomized yield test. The ratio of pounds of yield to pounds of seed planted is given along with parentage and brief description of each variety retained for increase in 1955.

Schaal table 2 lists those selections that were considered to have commercial possibilities. These selections were all indexed in the greenhouse and planted in smaller lots in the San Luis Valley for seed increase. All selections were planted as tuber units in the Fort Collins plot.

Schaal table 2. Colorado seedlings grown in Fort Collins, Colo., plot, 1954. Kept for increase and further testing in 1955.

Seedling number	Parentage	Tuber data		Total solids	Yield ratio
		Color	Shape		
				Pct.	
CS 11012	B 927-32 x B 991-3	Red	Round	22.2	1-15
CS 12623	CS 9887 x B 400-1	Red	Oblong	18.2	1-10
CS 11888	CS 10099 x B 991-3	White	Round	22.7	1-10
CS 11889	CS 10099 x B 991-3	White	Round	22.0	1-12
CS 11908	CS 10099 x B 991-3	White	Round		1-15
CS 11918	CS 10099 x B 991-3	White	Round	23.3	1-15
CS 12240	B 927-32 x 627-164	White	Round	23.5	1-12

Thirty-seven selections were planted and seven were retained for further testing. Most of those discarded had become heavily infected with virus diseases and were considered very susceptible. A few were discarded because of poor-shaped tubers or undesirable type plants. Those listed in table 3 were of excellent type and appeared to have good yields with few undesirable characters. These will be tested for yield in yield test plots in 1955.

The Eaton, Colo., Test Plot. 1954

Duplicate lots of the 119 seedling selections that were tested for scab resistance in scabby soil at Gilcrest and Ault, Colo., were grown at Eaton, Colo., in lot sizes varying from 30 to 100 hills.

These selections were rogued several times during the growing season and the horticultural characters noted. Some lots appeared to be infected with one or more viruses, and in some cases were rogued out completely. A few selections were rogued for undesirable type plants; others because of extreme

lateness. All lots retained were placed in storage and will be increased by tuber index method. These lots will be grown in a seed plot in the San Luis Valley and in the Fort Collins, Colo., adaptability plot next season.

Schaal table 3 lists those numbers retained for further testing. These lots represent the first increase from the 1953 five-hill selections, and were all included in the scab test plots at Gilcrest and Ault, Colo., in 1954.

Schaal table 3. Colorado seedlings grown in Eaton, Colorado, plot, 1954. Kept for increase and further testing in 1955.

Seedling number	Parentage	Tuber data		Total solids
		Color	Shape	
CS 12808	B 927-32 x B 920-5	White	Round	19.4
CS 12835	B 927-32 x B 2338-27	"	"	20.4
CS 12882	Yampa x 627-164	"	"	20.5
CS 12907	CS 10128 x 627-164	"	"	20.4
CS 12928	CS 10128 x 627-164	"	"	19.4
CS 12931	CS 10128 x 627-164	"	Oval	19.4
CS 12933	CS 10128 x 627-164	"	Long	18.9
CS 12964	CS 10220 x 627-164	"	Round	19.3
CS 12970	CS 10220 x 627-164	"	"	19.7
CS 12991	Yampa x B 772-8	"	"	19.9
CS 13035	B 2083 x B 927-32	"	Oval	19.3
CS 13091	B 461-31 x B 772-8	"	Round	19.7
CS 13153	US 627-164 x B 927-32	"	Oval	19.4
CS 13165	US 627-164 x B 927-32	"	Oval	19.9
CS 13174	US 627-164 x B 927-32	"	Round	19.3
CS 13178	US 627-164 x B 927-32	"	Oval	18.9
CS 13181	US 627-164 x B 927-32	"	Round	19.3
CS 13187	US 627-164 x B 927-32	"	Oval	18.2
CS 13188	US 627-164 x B 927-32	"	Round	17.7
CS 13222	CS 10082 x B 991-3	"	"	22.4
CS 13236	Yampa x 927-32	"	"	18.2
CS 13240	Yampa x 927-32	"	"	20.2
CS 13360	CS 9741 x CS 7724	Red	"	18.9
CS 13365	CS 9741 x CS 7724	"	"	17.7
CS 13441	B 2333-7 x B 2333-2	"	"	19.7
CS 13600	CS 7724 x B 2131-2	"	Oval	17.7
CS 13622	B 2159-2 x B 381-2	"	Round	22.0

THE INTER-REGIONAL POTATO INTRODUCTION PROJECT^{1/}
Sturgeon Bay, Wisconsin
R. W. Hougas and Roman Ross

New Introductions

Seeds and tubers were introduced in 1954 from 12 foreign countries (Argentina, Austria, Belgium, Canada, Chile, Costa Rica, England, Germany, Netherlands, Paraguay, Peru, Scotland). Foreign varieties, advanced breeding selections, species hybrids and selections of 22 new *Solanum* species were included among the stocks introduced.

Species On Hand

The collection now includes one or more selections of the following species:

acaule	chomatophilum	kesselbrenneri
acrosopicum	commersonii	lanciforme
ajuscoense	curtilobum	lapazense
alticola	demissum	laplaticum
andigenum	dolichostigma	leptostigma
andreanum	emneae	lignicaule
antipoviczii	famatinae	longiconicum
berthaultii	fendleri	longipedicellatum
boergeri	garciae	macolae
brachycarpum	gibberulosum	maglia
bulbocastanum	gigantophyllum	malinchense
calcense	goniocalyx	microdontum
canasense	gourlayi	moscopanum
capsicibaccatum	guerreroense	neohawkesii
cariophyllum	herrerae	neoweberbaueri
chacoense	jamesii	pampasense
parodii	santollalae	tarijense
phureja	schickii	tlaxcalense
pinnatisectum	simplicifolium	toralapanum
piurae	sogarandium	tuquerrense
polyadenium	soukupii	vallis-mexici
polytrichon	stenotomum	vavilovii
raphanifolium	stoloniferum	vernei
rybinii	suaveolens	verrucosum
saltense	subandigenum	xerophyllum
sambucinum	subtilius	yabari
sancta-rosae	sucrense	

^{1/} Cooperative with four Regional New Crops Projects and the Agricultural Research Service through its Plant Introduction Section.

Increase and Distribution of Stocks

The seed and tuber increase of stocks was very satisfactory in 1954. Weather conditions favored seed production in both the field and greenhouse. Success was realized in the program of obtaining true seed of many stocks which have previously been difficult to handle (e.g. self-incompatible and male-sterile stock).

Shipments of seeds (295) and tubers (892) were made during the past year to 16 states: Idaho, Iowa, Louisiana, Maine, Maryland, Minnesota, Montana, New York, North Carolina, North Dakota, Ohio, Pennsylvania, South Dakota, Washington, West Virginia, Wisconsin; to the territories Alaska, Puerto Rico; and 19 foreign countries: Argentina, Australia, Belgium, Brazil, Canada, Chile, Denmark, England, Germany, Indonesia, Israel, Japan, Netherlands, New Zealand, Pakistan, Peru, Portugal, Sweden, Tasmania.

Late Blight

A considerable portion of the species in the collection have been screened for their reaction to several races of P. infestans (New York, Iowa, Minnesota, West Virginia, Canada, Germany, Scotland). Resistance to race 1-2-3-4 was found in selections of 11 species, listed below, by Drs. M. E. Gallegly and W. Black, of the West Virginia Agricultural Experiment Station and the Scottish Plant Breeding Station, respectively.

Stocks Resistant to Race 1-2-3-4 of P. infestans (As reported by Gallegly and Black)

S. antipoviczii - P.I.s 195164, 201849

S. boreale - P.I.s 186546, 186547

S. bulbocastanum - P.I. 161156

S. demissum - P.I.s 160220, 160221, 160222, 160227, 160229, 160230, 161149,
161151, 161153, 161154, 161155, 161165, 161166, 161169,
161175, 161176, 161179, 161180, 161181, 161287, 161365,
161366, 161367, 161686, 161693, 161725, 161729, 161731,
161732.

S. longiconicum - P.I. 186567

S. longipedicellatum - P.I.s 160224, 161158

S. malinchense - P.I. 195167

S. pinnatisectum - P.I. 184774

S. pinnatisectum var. heptazygum - P.I.s 184764, 186553, 186554, 190115

S. polyadenium - P.I. 175444

S. stoloniferum - P.I.s 160225, 160226, 161150, 161172, 161770

S. tlaxcalense - P.I. 195169

S. verrucosum - P.I. 161128

S. verrucosum var. spectabilis - P.I.s 161174, 161726

Screening for reaction to race 1-2-3-4 was also reported by Dr. K. M. Graham, Division of Botany and Plant Pathology, Ottawa, Ontario, Canada.

Stock Resistant to Race 1-2-3-4 of P. infestans
(As reported by Graham)

S. antipoviczii - P.I. 195164
S. bulbocastanum - P.I. 161156 and Canadian selections CSCs 19, 20, 21, 22, 23
S. cardiophyllum - P.I. 160370 and Canadian selection CSC 18
S. demissum - P.I. 175408
S. longiconicum - P.I. 186568
S. longipedicellatum - P.I. 186544
S. pinnatisectum - P.I. 184764
S. stoloniferum - P.I.s 160224, 160226

The stocks listed above are currently available with the exception of the Canadian selections, which are now being increased and will soon be available.

Tetraploid hybrids, resulting from the hybridization of several of the more resistant S. demissum selections (P.I.s 160221, 160227, 160229, 160230, 161169, 161176, 161180, 161693, 161729, 161732) with 14 diploid species (S. berthaultii, S. gibberulosum, S. gigantophyllum, S. goniocalyx, S. phureja, S. rybinii, S. saltense, S. schickii, S. simplicifolium, S. soukupii, S. stenotomum, S. tarijense, S. verrucosum, S. yabari) recently have been added to the collection. These hybrids, developed through a cooperative project supported by the Wisconsin Alumni Research Foundation, are available for distribution in limited quantity. Some of these hybrids have been screened for their reaction to race 1-2-3-4, by Dr. M. E. Gallegly, and most were resistant.

Southern Bacterial Wilt

Screening of 133 selections for reaction to Pseudomonas solanacearum was reported by Dr. L. W. Nielsen of the North Carolina Agricultural Experiment Station. Promising resistance to the Southern bacterial wilt disease was found in the following selections:

S. pinnatisectum - P.I. 184774
S. pinnatisectum var. heptazygum - P.I.s 184764, 186554
S. sambucinum - P.I. 184762
S. andigenum - S. tuberosum hybrids - P.I.s 195140, 195143, 195145, 195147, 195149, 195150, 195154

Miscellaneous

Screening results for resistance to other diseases (scab, verticillium wilt, Y-virus, etc.) were reported by various stations; no outstanding resistance was reported. Evaluation of stocks for several horticultural characters was also reported. Interspecific crossability investigations were reported from three stations.

A more detailed list of stocks, and pertinent information concerning these stocks, will be found in the 1954-55 Inventory of Tuber-bearing Solanums which will soon be distributed by the Inter-Regional Potato Introduction Station.

NORTH CENTRAL REGIONAL POTATO TRIALS 1954
August E. Kehr and Cooperators^{1/}

The most outstanding feature of the 1954 trials was the determination among the cooperators to maintain the trials in spite of difficulties entailed by the lack of a coordinator during part of the year. Special recognition for the success of the 1954 trials should go to Dr. J. H. Schultz of North Dakota for his part in initiating the trials, as well as to N. K. Ellis, N. R. Thompson, H. O. Werner, Robert Johansen, and G. H. Rieman for their share in conducting the trials in their respective States.

This marks the completion of the fourth year for these cooperative trials. The test in Iowa was completely destroyed by floods in June. No reports were submitted from South Dakota, Minnesota, or Kansas for various reasons. Entries included 13 named or numbered varieties at all locations. However, in some instances a few additional varieties were included. Triumph, Cobbler, and Katahdin were checks in all tests. No effort was made this year to divide the tests on a split-plot design between early and late varieties.

Because of the lack of complete uniformity in the varieties grown and method of submitting data, it is impossible to combine the data.

It can be noted from North Central table 1 that the varieties were subjected to quite a variable environment. Soil moisture conditions ranged from rather severe drought in Wisconsin to irrigation in Michigan and Nebraska. In Nebraska the soil moisture was kept adequate all season. Stands were quite uniform in all tests except Michigan where severe rains drowned out almost a complete replication. Soils were upland in all except Indiana. These differences in environment probably account largely for the variability in yields and relative rank of individual varieties at the different locations.

In North Central table 2 are given data on yields of U.S. No. 1 per acre and total solids. As in the past, the least significant differences were computed.

Scab and maturity data are given in North Central table 3. There is general agreement on maturity, but apparently the scab reactions varied markedly in the different locations.

Grade defects reported from Indiana were chiefly second growth and growth cracks. In general, all varieties behaved similarly, and no one variety was singled out as being worse than another.

^{1/} Special recognition is given to Dr. E. P. Lana and Robert L. Plaisted for their helpful suggestions in preparing this report.

In Michigan external defects (scab, sunburn, growth cracks, and second growth) were more serious in Wis. 27.50, Katahdin, Wis. 1429, N.D. 457-1-16, Cobbler, N.D. 2231-2, and Triumph. Hollow heart was most prevalent in Cobbler, Katahdin and Wis. B 27.50. Internal necrosis was severe in Redglo and Cobbler. All varieties except Wis. 0103.51 and Triumph had excessive vascular discoloration.

In North Dakota external defects were high in Minn. 18, Katahdin, Wis. 1429, Mich. BP 50.8, Minn. 1, N.D. 457-1-16, and Minn. 11. Both internal necrosis and vascular browning was found in Minn. 1. Some hollow heart was found in N.D. 457-1-16, Minn. 1, and Wis. 103.50.

In Wisconsin hollow heart was found in N.D. 2124-20R and internal necrosis in Minn. 1.

Outstanding varieties reported with their relative ranking are:

Indiana	- (1) Wis. 1429
	- (2) N.D. 2124-20R
North Dakota	- (1) Wis. 0103-50
	(2) N.D. 2231-2
	(3) Wis. 27.50
	(4) Neb. 26.44-1
	(5) Minn. 11
Wisconsin	- (1) N.D. 457-1-16
	(2) Wis. 0103.50
	(3) Neb. 26.44-1
	(4) Minn. 11
	(5) N.D. 2124-20R
Nebraska (varieties with average rating of 9-)	
	(1) Wis. 27.50
	(2) Wis. 0103-51
	(3) Dazoc
	(4) Neb. 26.44-1

North Central table 1. North central potato trials, 1954.

	Indiana	Michigan
Cooperator	N. K. Ellis	N. R. Thompson
Location	Walkerton, Ind.	Lake City Expt. Station
Soil Type	Muck Soil	Iosco Sandy Loam
Fertilizer	1200#/A 3-9-27	800#/A 3-12-13
Spacing	Hills 12", rows 3'	Hills 11", Rows 3'
Date Planted	May 6, 1954	May 18, 1954
Date Harvested	September 30, 1954	October 6, 1954
Remarks	Normal growing conditions except dry in June and July, Dithane first 3 weeks, Bordeaux weekly remaining sprays, DDT-6 sprays, stand-uniform.	Heavy rains in June resulted in poor stand. Plots irrigated 4 times with 1 acre inch per application. Vines killed 10/14 with roto beater. Dithane & DDT applied weekly.

North Central table 1 continued

Nebraska		North Dakota
Cooperator	H. O. Werner	Robert Johansen
Location	Alliance, Nebr.	Grand Forks, N. Dak.
Soil Type	Very fine sandy loam	Bearden Clay Loam
Fertilizer	----	200#/A 0-30-15
Spacing	Hills 12", rows 3'	Hills 14", rows 38"
Date Planted	June 18, 1954	May 20, 1954
Date Harvested	October 8, 1954	September 21, 1954
Remarks	Seven irrigations	Rainfall adequate, temperatures cool, Toxaphene and DDT used to control insects.
Wisconsin		
Cooperator	G. H. Rieman	
Location	Rhineland, Wis.	
Soil Type	Sandy loam	
Fertilizer	900# -3-12-12	
Spacing	Hills 12", rows 3'	
Date Planted	May 10, 1954	
Date Harvested	September 14, 1954	
Remarks	Normal growing conditions except for severe drought in August. Parzate 7 days schedule, DDT - 14 day schedule, stand-uniform.	

North Central table 2. Yield per acre, percentage U.S. No. 1 tubers, and total solids of entries in North Central Regional Trials 1954.

Entry No.	Variety or selection	Indiana			Michigan		
		Yield per A. of U.S. No. 1		Total solids	Yield per A. of U.S. No. 1		Total solids
		Bu.	Pct.		Bu.	Pct.	
1	Triumph	678	55	15.3	165	80.2	16.7
2	Cobbler	704	70	17.5	169	84.4	16.7
3	Red glo	538	40	16.9	167	87.7	16.2
4	Sheridan	595	50	18.0	240	88.3	17.1
5	Neb. 26.44-1	662	65	17.1	243	94.4	18.0
6	N.D. 457-1-16	742	50	16.7	148	91.5	17.2
7	N.D. 2124-20R	703	85	18.0	153	89.2	16.5
8	N.D. 2231-2	762	75	18.1	169	84.3	18.8
9	Wis. D27.50	854	70	17.1	223	88.0	16.2
10	Wis. 0103.51	845	60	16.4	169	83.8	16.9
11	Wis. 1429	654	75	17.9	142	84.3	16.7
12	Mich. BP 50-8	410	55	16.4	276	90.6	17.9
13	Katahdin	602	70	17.1	261	97.4	19.4
L.S.D. P = .05		-			63.4		
P = .01		-			85.1		
C.V.		-			22.86%		

		Nebraska			North Dakota	
1	Triumph	511	67.5	365	92.0	18.9
2	Cobbler	569	79.1	425	91.4	21.6
3	Red glo	501	75.2	416	91.4	20.6
4	Sheridan	551	90.6	371	91.4	20.2
5	Neb. 26.44-1	533	90.5	393	92.4	20.0
6	N.D. 457-1-16	515	81.4	435	87.7	20.4
7	N.D. 2124-20R	---	----	362	94.9	20.8
8	N.D. 2231-2	406	83.6	391	91.5	21.4
9	Wis. D27.50	434	89.0	347	93.6	20.0
10	Wis. 0103.50	523	88.5	401	92.3	18.9
11	Wis. 1429	333	92.3	268	86.2	22.2
12	Mich. B.P. 50-8	391	82.2	297	86.0	19.7
13	Katahdin	477	89.8	271	84.3	19.5
14	Minn. 1	---	----	281	86.9	19.7
15	Minn. 11			369	89.4	20.1
16	Minn. 18			272	81.6	20.5
17	Progress	562	86.0			
18	Dazoc	565	85.7			
L.S.D. P = .05		76.1		48.7		
P = .01		101.6		64.9		
C.V.		10.87%		9.65%		

1/ Adjusted to uniform stand by covariance.

North Central table 2 continued

Entry No.	Variety or selection	Wisconsin		
		Yield per A. of U.S. No. 1		Total solids
		Bu.	Pct.	
1	Triumph	316	-	20.4
2	Cobbler	280	-	22.5
3	Redglo	227	-	19.7
4	Sheridan	310	-	20.9
5	Neb. 26.44-1	357	-	22.4
6	N.D. 457-1-16	318	-	20.5
7	N.D. 2124-20R	311	-	21.7
8	N.D. 2231-2	244	-	22.6
9	Wis. D27.50	286	-	19.2
10	Wis. 0103.51	329	-	20.9
11	Wis. 1429	283	-	20.3
12	Mich. B.P. 50-8	304	-	21.7
13	Katahdin	281	-	21.5
14	Minn. 1	276	-	20.3
15	Minn. 11	294	-	22.0
16	Minn. 18	294	-	20.1
L.S.D. P = .05		62.7		
P = .01		83.7		
C.V.		14.73%		

North Central table 3. Maturity, scab, and grade defect notes on entries in North Central Regional trials.

Entry No.	Variety or selection	Maturity			Scab				Normal tubers per 100		
		Mich.	N.D.	Wis.	Ind.	Mich. ^{3/}	Neb. ^{4/}	N.D. ^{3/}	Mich.	N.D.	Wis.
		<u>1/</u>	<u>1/</u>		<u>2/</u>				No.	No.	No.
1	Triumph	1.5	1.8	E	3/3	1/3	8.0	1/3	91	100	100
2	Cobbler	2.0	2.0	E	3/3	1/3	3.4	1/2	64	98	98
3	Redglo	2.5	2.8	M	3/3	1/3	16.3	2/3	66	100	100
4	Sheridan	2.3	2.3	E	3/3	T/2	1.0	1/2	78	100	100
5	Neb. 26.44-1	2.8	2.5	E	3/3	T/1	1.5	1/2	72	99	100
6	N.D. 457-1-16	2.8	2.0	E	3/3	1/3	0.8	1/2	65	96	100
7	N.D. 2124-20R	3.8	3.0	L	3/2	1/1	-	1/2	71	98	96
8	N.D. 2231-2	3.8	3.3	M	3/3	1/4	0.6	1/2	72	98	98
9	Wis. D 27.50	3.5	3.8	E	3/2	1/1	.0	1/2	88	99	98
10	Wis. 0103.51	3.8	4.0	L	3/3	T/1	.0	1/2	93	97	100
11	Wis. 1429	3.0	2.5	E	2/2	T/1	.5%	1/2	86	99	100
12	Mich. B.P. 50.8	4.8	5.0	L	2/3	T/1	.0	1/2	75	98	100
13	Katahdin	4.0	4.0	L	2/3	1/2	1.8	3/2	81	98	100
14	Minn. 1		3.3	M				2/3		84	94
15	Minn. 11		4.0	L				2/3		99	100
16	Minn. 18		3.3	M				2/2		99	100
17	Progress						1.3				
18	Dazoc						4.8				

1/ Maturity rating; 1 early, to 5 late

2/ Figures to left indicate area, to right type of scab.

3/ Average of 4 reps.

4/ Expressed as a percentage of total U.S. No. 1.

PACIFIC NORTHWEST
John G. McLean

The 1954 potato crop was delayed by June frosts, and the season was shortened by a killing frost on September 6. The symptoms of Verticillium wilt were delayed at Aberdeen, but differential readings could be made by late August.

Verticillium Wilt:

At Rexburg, in addition to the short growing season, the plants were subjected to extremely wet soil conditions. The canal adjacent to the plot had been cleaned out and deepened. This resulted in a more porous canal and kept the water table at about 12 inches below the surface of the soil throughout the growing season. As a result, Verticillium wilt symptoms appeared early and were very severe at Rexburg.

Under the unfavorable growing conditions and severe disease manifestations at Rexburg, 41956 was outstanding in resistance, yield, and quality (McLean table 1). Kennebec, although seriously affected by the disease, produced a significantly greater amount of U. S. No. 1 tubers than did Russet Burbank.

Highly significant negative correlations were again found between Verticillium wilt and total yield (-0.509) and between wilt and the yield of U.S. No. 1 tubers (-0.583) in the variety trial and in the seedling test (-0.577, yield, and -0.429, U.S. No. 1). Disease index in the seedlings ranged from 80 to 0,

McLean table 1. Yield, Verticillium wilt, grade, and quality of five varieties at Rexburg.

Variety	Verticillium index	Yield		Dry matter Pct.
		Total	U.S. #1	
		Sx. 1A	Sx. 1A	
41956	7.0	251.3	193.3	23.7
Kennebec	46.7	167.9	131.6	19.9
A101-17	24.2	145.3	83.2	21.7
Menominee	17.5	140.7	103.8	21.2
Russet Burbank	53.1	119.2	36.7	19.2
L.S.D. at .05	10.4	73.5	70.6	.3

whereas yields were from 420 to 22 sacks per acre. A104-1 (Mohawk x Menominee) showed no disease and produced the highest yield. A russet-type potato, A119-15 (Russet Burbank x A102-35), with a disease index of 25, produced 342 sacks per acre and shows promise as a commercial type potato.

Verticillium Resistance:

The physiological resistance of late-maturing potatoes and the susceptibility of early types have made it difficult to determine whether a given line might be suitable for parent material or merely produce late-resistant types. In McLean table 2, family line A181 represents the expected when little or no resistance is used in the parents. The earlier types are infected while the late plants are relatively free of Verticillium. When resistant parents were used as in family lines A205, A183, and A188, healthy plants of medium maturity were found. From other crosses, a few early-maturing, healthy plants were obtained. It appeared that a high type of field resistance had been developed in some of the white-skin types and although semi-resistant russets have been found, more crossing is needed to develop highly resistant russets.

McLean table 2. Maturity and diseases in four family lines.

Line and parents	Maturity	Severe	Moderate	Slight	Healthy
		Pct.	Pct.	Pct.	Pct.
A205-	Early	18.7			
41956 (Med. Res.)	Medium	9.4	9.4	14.6	25.0
x Menominee (late-Res.)	Late			6.2	14.6
A183-	Early	27.8	5.6		
Early Gem (Early-Susc.)	Medium	5.6	11.1	11.1	5.6
x B986-7 (Late-Res.)	Late		5.6	2.8	25.0
A181-	Early	29.4	2.9		
1276-185 (Early Susc.)	Medium	32.4	11.7	8.8	
x Early Gem (Early-Susc.)	Late			2.8	11.7
A188-	Early	12.8			
Sequoia (Late-Res.)	Medium	18.0	7.7	18.0	15.3
x Early Gem (Early-Susc.)	Late			5.1	23.0

Leafroll:

The leafroll-resistance trial at Parma, Idaho, was too severe for most of the lines being tested. Triumph, Aquila, and 1276-185 were seriously affected. Only 2 lines were above suspicion of leafroll after 2 year's exposure. These were B 579-3 and B 2759-5.

The green peach aphid is the main vector of leafroll in western Idaho and is apparently favored by plants that allow the lower leaves to shade the ground. To determine if leafroll resistance and aphid resistance were correlated 4 varieties were planted in a latin square and aphid counts were made July 9, July 22, and August 6. Mr. Art Walz, University of Idaho entomologist, made

most of the counts. The resistant B 579-3 and the susceptible Early Gem both produced more erect open plants with few leaves touching the ground, whereas the susceptible Russet Burbank and resistant B 2361-2 shade the ground with the lower leaves. The results shown in McLean table 3 indicate that the leaf-roll-resistant varieties favored aphid production. These results are similar to those reported by S. B. Locke (Phytopath 44: 496. 1954). B 2361-2 had significantly more aphids than either of the susceptible varieties. The difference due to growth habit of the plant were not significant and averaged only about 2.5 aphids per 50 leaves.

McLean table 3. Average number of green peach aphids per 50-leaf sample.

Variety	Aphids
	No.
B 2361-2	21.0
B 579-3	19.1
Russet Burbank	13.3
Early Gem	10.3
L.S.D. at .05	7.4

Scab:

Scab was again severe at Aberdeen. Scab and ferric chloride readings of the periderm were correlated on 450 seedling lines and varieties. A highly significant correlation (-0.477) was obtained.

SOUTHERN PROJECT
(Louisiana Headquarters)
T. P. Dykstra

With the exception of a few areas, 1954 was a favorable year for potato production in the South, and the yields were higher than usual. The prevailing temperature during the potato-growing season, roughly from January until May, was below average. In most of the States rainfall was sufficient, except in Baldwin County, Alabama, where the rainfall was the lowest on record in 40 years. In spite of this, a satisfactory yield of high-quality potatoes was produced there this year.

At the Cumberland Plateau Experiment Station, Crossville, Tenn., where the seedling increase plots are located, ideal growing conditions existed until the middle of June. Unfortunately, unusual and persistent high temperatures, generally in excess of 100°, combined with drought, prevailed during the remainder of the growing season. This resulted in a reduction in size of tubers and total yield of the seedlings, but a fairly satisfactory crop was obtained.

A new technique in collecting and storing potato pollen developed by J. R. King^{1/} was used in making crosses in the field at Crossville. This provided an abundance of pollen. In the past, lack of sufficient pollen always has been a limiting factor under southern growing conditions.

The new method enabled the making of crosses at any time during the day, and as a result a very high percentage of the crosses made resulted in seed sets. On account of excessive high temperatures and drought following pollination many of the seed balls dropped prematurely.

A total of 9,000 first-year single tubers were planted, involving progenies from 67 different crosses. These consisted of tubers of seedlings grown in the greenhouse in Baton Rouge, La., and of tubers provided by F. J. Stevenson of Beltsville, Md., and C. E. Peterson of Ames, Iowa. In addition to this, varying amounts of 418 different seedlings saved from previous years were increased for additional tests.

As in the past, emphasis is on the production of early, high-yielding, red-skin varieties, resistant to late blight and scab, and well adapted to growing conditions in the deep South.

For the highly elevated, late-maturing sections of Tennessee, Georgia, North Carolina, and for certain other white-potato-producing areas in the South, efforts are being continued to develop a white variety of medium maturity resistant to late blight and scab.

^{1/} See under Louisiana

The practice of sending seedlings to cooperators for observation only has been discontinued. Instead, enough tubers are sent to plant a preliminary yield trial of at least 3 replications of 25 hills. From now on most of the seedlings will be grown in preliminary yield plots in two locations in Louisiana, where their performance will be observed closely. Only the most promising ones of these will be sent to other States for additional tests for adaptability. Table 1 (Dykstra) gives the number of seedlings sent to the cooperating States in 1954.

The data on the performance of seedlings grown by cooperators will be found in the reports of the respective States. Comparison of the yields of the seedlings grown in different States is given in table 2. Most of the cooperators selected a number of seedlings which they reported as looking exceptionally well in their plots. These included seedling 1859, 2109, 2827, 3674, 3769, 3953, 3954, 4409, and 4454. Most of these seedlings will be increased and tested on a larger scale.

Dykstra table 1. Seedlings sent to cooperating States in 1954.

State	Seedling varieties	Resistant to blight	Resistant to scab
Alabama, Fairhope	9	4	4
Florida, Hastings	20	17	5
Florida, Homestead	17	6	11
Georgia, Savannah	10	8	3
Louisiana, Baton Rouge	55	23	25
Mississippi, College Station	12	5	4
North Dakota, North Wood	45	17	24
South Carolina, Crossville	14	10	6

The method used last year in testing seedlings for resistance to scab by growing these in vermiculite infested with Streptomyces scabies as described in detail in last year's report continued to give very satisfactory results. Small seedling plants having only a few leaves may be transplanted from the flats into a greenhouse bed a few inches apart. In the fluffy vermiculite it is easy to remove the entire plant with tubers adhering on the stolens to take a reading on scab infection. Scab lesions developed readily on the small tubers of susceptible plants, and an accurate screening test on scab resistance can be obtained. The advantage of testing these in the first-year seedling state is that the tubers or plants of susceptible individual seedlings are not killed, as in the case of testing for blight resistance in the first-year seedling stage. This advantage is especially apparent if a progeny is tested developed originally for the purpose of developing resistance to a number of diseases in addition to scab. A scab-susceptible seedling may want to be retained on account of other qualities. This procedure enables one to do so and to obtain a record on scab resistance of each individual plant of a progeny in the greenhouse before planting the tubers in the field.

Dykstra table 2. 1954 yield records of U. S. No. 1 tubers in bushels per acre obtained from Tennessee grown seedlings planted in different locations.

[illegible]

No.	Parentage	: tubers:	: Ala.:	: Fla.:	: Miss.:	: Bu.:	: Rio	: Grande	: Valley,	: S. C.:	: N. C.:	: Ga.:	: Tenn.:	: Fla.
:	:	: Color	:	: Home	:	: Bu.:	: Rio	:	: Grande	:	: Bu.:	: Bu.:	: Bu.:	: Bu.
:	:	: of	:	: stead	:	: Bu.:	: Grande	:	: Valley,	:	: Bu.:	: Bu.:	: Bu.:	: Bu.
:	:	: tubers:	: Ala.:	: Fla.:	: Miss.:	: Bu.:	: Rio	: Grande	: Valley,	: S. C.:	: N. C.:	: Ga.:	: Tenn.:	: Fla.
4112	Kennebec OP	White	222											
4145	C 8859 x C 7702	Red		240		192								
4190	C 7724 x B 400-1	Red		272										
4264	B 779-1 x B 446-8	White												
4279	B 879-1 x Kennebec	"												
4379	B 879-1 x B 929-6	Red	183				120							195
4393	528-170 x B 381-2	"	180				101							148
4394	R 1153-10 x B 878-29	White												
4399	B 56-11 x B 381-2	Red		129			175			375			107	210
4409	T15 x B 355-24	White			65									
4411	B 606-37 x B 56-1	Red	190	273	112		161					164	131	
4413	T15 x B 355-24	White			51							102		
4422	B 56-9 x B 381-2	Red	236		124		146					131		
4426	B 76-43 x 96-56	White												
4429	B 608-56 x B 580-20	"			85					510			156	272
4441	B 381-2 x B 874-15	Red		169			116							259
4442	B 381-2 x 528-170	"					82							
4451	Mohawk x 169-52	White												
4454	B 446-54 x Teton	"								440		148	230	143
4455	B 606-37 x B 381-2	"								210		101		
4458	Pontiac x B 400-1	Red	180	246	95		155							
4467	B 66-1 x B 778-43	White												
4468	B 929-6 x B 724-1	"			57					475		172		82
4719	B 607-56 x B 355-24	"								355		160		300
4720	B 607-56 x B 355-24	"											194	
4731	B 779-16 x B 962-32	"			160								106	
4732	B 779-16 x B 962-32	"			136									
4735	Kennebec x B 922-3	Red	197				94						136	230
4739	B 66-1 x B 778-43	"	227											
4753	B 606-37 x B 56-1	"	162											
4766	B 606-3 x 1153-10	"	63											
4772	B 607-37 x 381-2	"					121							
4773	B 595-76 x B 606-32	"								490				162

U.S. - Colo. Potato Field Station (Greeley, Colo.)
W. C. Edmundson

Potato-breeding studies for 1954 consisted of breeding for scab resistance with good cooking quality, with both red and white varieties. Some of the parent material was supplied from Beltsville; to this was added the most promising scab-resistant lots developed at Greeley. Many of the parent lots were selected because of their high specific gravity.

The 1954 test included the first-year seedlings in family lines, second-year seedlings in 5-hill lots, increase plots in 32-hill and 100-hill lots, testing of older seedlings on a field basis, and yield test of seedlings.

In addition to the test plots at the Station, seed of all lots planted in the 32-hill plots and the extra increase lots were supplied to the Colorado A & M College for testing in other parts of the State. The same lots were also supplied to Dr. L. A. Schaal for scab-resistance studies.

The growing season of 1954 was very unfavorable for potato production. The yield per acre was below normal, and the quality of the crop was not good. The specific gravity of all seedlings and varieties tested at the Station in 1954 was low. The weather for the most part was hot and dry. There were many days when the temperature reached 105° to 108° F. There was but 5.86 inches of rain recorded at the Station from March 1 to October 31. No late blight was noted at the Station but early blight was observed, although 3 sprays and 2 dusts were applied. Considerable flea-beetle injury was noted in plots sprayed with DDT. Growers also report that DDT did not give a satisfactory control for the flea beetle. Psyllid yellows was noted in the plots late in August. The psyllid population, however, was low according to counts made in the check plot of the spraying experiment.

The 1954 family lines were planted May 13. Planting the family lines the middle of May has given better results than planting the first week in June, as has been the practice. The early planting resulted in larger size tubers. A large number of good-type white seedlings were selected at time of harvest. A number of good dark-red seedlings were also selected. Most of the red seedlings are generally of poor type, or light in color. About 900 of the 1954 seedlings were selected for testing in 1955.

In the test of second-year seedlings, 921 were planted in 5-hill lots. Owing to the difficulty of making selections at time of harvest, a large number of seedlings were retained for a more careful examination. These lots have been re-examined, and all lots infected with scab, those indicating a tendency to growth cracks, or having other objectionable features were discarded. All lots that were retained for further tests will be planted on a tuber-unit basis in 32-hill lots at the Station in 1955. These lots will be tested for scab resistance. The remaining tubers of each lot were retained and will be tested by members of the staff of the State Experiment Station.

Of the older seedlings 209 were planted in 32-hill lots on a tuber-unit basis. All lots were retained at time of harvest for closer study. All of these lots were weighted later and carefully examined for type, scab, growth cracks, second-growth and other defects. Specific gravity readings were made of all lots retained for future tests. The lots retained will also be tested at different locations by State cooperators. Fifty seedlings were planted in 100-hill lots and 20 seedlings were planted on a field basis in tuber units. Some were planted in half-row plots, some in full-row plots, 540 feet long.

Seed from 42 crosses was planted in the greenhouse on August 9. About half of the lots were from crosses made last spring in the greenhouse and the other half was seed produced the previous year. In the past, current-year seed has been slow to germinate. This year and last year the seed extracted in May germinated uniformly within a few days of the time required for the year-old seed to germinate. The seedlings were spotted the first week in September. Seed from 15 crosses in which red parents were used were included in the plantings. A list of red parent crosses, together with the number of dark red, medium red, light red, and white tubers produced, is given in Edmundson table 1. A larger number of dark-red and medium-red seedlings were obtained this year than had been secured in past years. Many of the seedlings listed as light red will probably produce darker tubers in the field soil.

Twenty-eight seedlings and varieties were included in a yield test plot. The plot consisted of 25-hill lots randomized and replicated 5 times. The tubers were graded for sizes above and below 1 7/8 inches in diameter. Tubers from each of the 5 replications were used to determine the specific gravity of each seedling or variety. The data for yield, specific gravity, starch content, and dry matter are given in Edmundson table 2. The starch content was low in all lots included in the yield test. This was also true for potatoes grown throughout the district this year.

Edmundson table 1. Red crosses 1955 family lines, Greeley, Colo.

Cross No.	Parentage	Dark red	Medium red	Light red	White	Total
28	CS 11011R x B 381-2R	4	8	82	95	189
29	CS 9887R x B 2131-3R	2	7	42	118	169
30	CS 9887R x B 400-1R	2	4	61	148	215
31	CS 9887R x B 381-2R	6	11	79	81	177
32	CS 9741R x B 400-1R	3	6	69	87	165
33	B 2159-1R x B 2162-49R	21	20	87	52	180
34	B 2159-1R x CS 10585R	13	38	88	9	148
35	B 381-2R x CS 10585R	4	18	88	19	129
36	CS 12621-R x CS 12623R	4	16	85	3	108
37	CS 10999-R x CS 12623R	13	31	88	5	137
38	CS 12621-R x B 381-2R	0	8	73	38	119
39	B 381-2R x CS 10999R	6	12	103	10	131
40	CS 7137-R x B 381-2R	2	19	91	22	134
41	B 2337-2R x B 381-2R	3	9	105	25	142
42	CS 11101R x B 381-2R	5	9	84	49	147
	Total	88	216	1225	761	2290

Edmundson table 2. Yield test, Greeley, Colo., 1954

Variety	Mean total yield per acre	Mean per acre above 1 7/8"	Mean specific gravity	Dry matter
	Bu.	Bu.		Pct.
CS 10185	452	440	1.0757	18.7
CS 10513	516	472	1.0826	20.2
CS 10670	454	399	1.0727	18.2
CS 10854	328	227	1.0867	21.2
CS 11565	314	279	1.0826	20.2
CS 11591	337	258	1.0905	21.9
CS 11626	434	377	1.0720	17.9
CS 11730	493	406	1.0821	20.2
CS 11737	428	369	1.0774	19.2
CS 10857	317	282	1.0666	16.7
CS 11863	478	390	1.0727	18.2
CS 11908	482	465	1.0713	17.9
CS 11969	485	394	1.0825	20.2
CS 11981	475	434	1.0734	18.2
CS 12132	426	393	1.0787	19.4
CS 12240	500	431	1.0844	20.7
CS 12268	391	339	1.0722	17.9
CS 12288	437	397	1.0751	18.7
CS 12368	427	347	1.0875	21.2
CS 12441	429	362	1.0728	18.2
Triumph	455	411	1.0690	17.4
CS 12529	427	385	1.0730	18.2
CS 12583	448	404	1.0831	20.4
B 926-9	470	413	1.0725	18.2
Katahdin	453	534	1.0811	19.9
Delus	437	400	1.0851	20.9
Merrimack	333	303	1.0897	21.9
Saco	634	596	1.0829	20.4
L.S.D. at 5%	65.9	66.4	0.0034	
" 1%	89.1	89.6	0.0045	

ALABAMA, Fairhope
Frank Garrett

The 1954 potato-growing season was the driest on record for the past 40 years. In spite of this, a satisfactory yield of high quality potatoes was obtained. Twenty-four named and numbered varieties were tested for yield. The data for ~~yieldare~~ given in Alabama table 1.

Ala. table 1. Yield test at Fairhope, Ala. 3 replications of 25 hills.

Variety or seedling	Parentage	Average yield U.S. No. 1 tubers
		Bu.
Red La Soda*		283
Bliss Triumph*		270
82-269*	176-26 x 179-26	270
1859	Pontiac x 96-56	257
4422	B 56-9 x B 381-2	237
1396	176-26 x 179-26	237
4411	B 606-37 x B 56-1	237
3972	Pontiac x B 400-1	223
4112	Kennebec selfed	222
4753	B 606-37 x B 56-1	220
La Soda#		207
3976	Pontiac x B 400-1	203
4739	B 66-1 x B 778-43	197
4379	B 606-37 x B 56-1	183
4458	Pontiac x B 400-1	180
4766	B 606-3 x B 1153-10	162
81-113*	B 76-23 x Katahdin	153
4393	528-170 x B 381-2	150
2766	B 56-11 x 528-170	146
3655	1930 x B 404T	143
92-23*	L113 x 465	123
3058	B 2162-49	120
82-94*	X590 x Cayuga	106
4772	B 606-37 x B 381-2	63
L.S.D. at 5%		71

*Louisiana seedlings and varieties grown in South Dakota. Remainder U.S.D.A. seedlings increased at Crossville, Cumberland Plateau, Tenn.

ALASKA
Curtis H. Dearborn

Characteristics of Newer Stateside Potato Varieties
When Grown in Alaska

Alaska's position in the program to improve the potato is unique in two respects. A long day-length during the growing season coupled with cool air and soil temperatures provide a favorable environment for plant growth. A pyroheliometer at Matanuska makes available a permanent record of our light intensity and duration. The second factor--freedom from insects and foliage diseases--permits growing of breeding stocks and commercial crops without spraying or dusting. Roguing for leaf disorders and off-types is a simple matter under such conditions.

Certified stocks of imported varieties from the States frequently show leaf abnormalities fairly typical of some virus disease manifestations in the States. Through the use of the tuber-unit system these diseased hills can be rogued and the leaf abnormality eliminated henceforth from the variety.

With these thoughts in mind, it seems appropriate to describe briefly some responses of newer potato varieties in this environment. Observations made thus far indicate that newer varieties in the States usually are not adapted in this Territory. The reasons why they are unsuited may be of value to other potato breeders. The principal defects of a few varieties are given below.

Canso - As an early potato the heavy stolons adhere to the tuber making it difficult to harvest. The skin slips easily and leaves an objectionable yellow ground color.

Canus - Shatter bruising, coupled with low specific gravity and scab susceptibility, disqualifies this variety.

Cherokee - This is a short, oblong tuber with a very deep eye group at the apical end. Since its resistance to scab has not been superior to Ontario its depth of eye will doubtless prevent any general planting of Cherokee in Alaska.

Early Gem - Over half of the yield of this variety was lost because of shatter bruising and growth cracking. In addition, the specific gravity of 1.068 is considered low for Alaskan potatoes. Shoulders are common in the region of the basal eyes.

Kennebec - This is one of the best potatoes for the late crop. It has good culinary qualities and yields equal to Arctic Seedling. Hollow heart can be serious in the larger tubers and it is for this reason alone that it has not gained wide acceptance. The rugged vines are more resistant than most

varieties to a nutritional disturbance that resembles zinc deficiency. It sets seed balls freely in some seasons.

Keswick - Shatter bruising is severe and this, coupled with an extremely deep stolon cavity, leaves much to be desired in this variety. The tubers are round and of fair quality.

Manota - This produces a smooth white tuber that shows some shatter bruising. The tubers are large and of fair culinary quality. It will be continued in tests.

Osseo - Shatter bruising is so severe on these round tubers that none of U.S. #1 size has been free of the cracking. Where Arctic Seedling has a specific gravity of 1.089, Osseo shows 1.075.

Progress - Small round tubers are compressed so that both the apical eye group and the stolon cavity are objectionably deep. Shatter bruising accounts for a loss of a third of the #1 sized tubers.

Redburt - One season's observations indicate that capacity to make large, thin, oblong tubers may place this variety among those considered for early harvest. A very deep eye group and a high percentage of hollow heart were noted.

Redkote - Heavy, overhanging eyebrows on a short oblong tuber with very deep set eyes mark this variety as not well adapted. The light red skin slips badly exposing a yellowish ground color, which also detracts from good tuber appearance. A few showed shatter bruising.

Russet Sebago - The most conspicuous feature of this variety is a calico mottling of the skin. This defect, plus a large number of Y-shaped check marks on the skin, typical of some varieties that have some scab resistance, makes the tubers of this variety unsightly. Early sprouting in storage is also common.

Satapa - The thick oval uniform tubers shatter bruise so badly that it is impractical to grow this variety even for the home gardener. It is of excellent eating quality and remains white after cooking. It is an attractive tuber with shallow eyes and a dull red skin.

Waseca - This is a flattened oval to heart-shaped tuber that develops very deep eyes. The skin is rough and frequently cracks across the shoulder of the apical buds late in growth. Hollowness is common in the large tubers. It sprouts early in storage and is of low specific gravity.

White Cloud - This is a short oblong to cylindrical tuber of medium quality with better than average appearance. It has uniform shape, moderately shallow eyes and a good smooth skin. It is very susceptible to scab and has not been placed in a replicated trial for yield performance because of its scab tendency.

Yampa - One seasons¹ observation indicates that this variety develops very large thick oval-shaped tubers. Hollow heart is too common. The skin is attractive except for a few small scab lesions.

We, in Alaska, are grateful to all who have so kindly aided in sending tubers and seeds. This season we will evaluate 14,000 to 15,000 individual lines of potatoes for horticultural characteristics that were bred for scab resistance.

Solanum demissum and S. acaule have demonstrated the value of the frost hardy characteristic in this environment.

CALIFORNIA
Glen N. Davis

Potato experimental plots were located in Kern, San Benito, and Siskiyou counties in 1954. Fertilizer at all three locations was applied at the time of planting. The fertilizer used was ammonium sulphate at 600 pounds per acre.

The Kern County planting consisted of a test for variety yield and one for resistance to common scab. The yield test included 7 varieties and 2 seedlings. The data are given in Calif. table 1. The scab test was planted on heavily infested soil and included White Rose as the check, the variety Cherokee, and 27 seedlings. The data are presented in Calif. table 2.

The San Benito County plot included a test for variety yield and one for resistance to verticillium wilt. The yield test, Calif. table 3, included 10 varieties and 1 seedling (A101-17 from Dr. John McLean at Aberdeen, Idaho). Seedling A101-17 showed some promise in 1953 so was included in the 1954 yield test. A101-17 again looked promising, (Calif. table 3). It was above the check (Russet Burbank) in yield, highly resistant to verticillium wilt, had the highest specific gravity of those lines included in the yield test, and chipped well in a test run by a commercial chipper.

The data from the test for Verticillium wilt resistance are presented in Calif. table 4. The variety yield test plot at Tulelake included 10 varieties and 1 seedling. The variety Russet Burbank was considered the check. The Tulelake test plot was planted on May 10 at which time sufficient seed was not available to plant a uniform number of replications. The seed of each lot was planted as far as it would go. As a result, no attempt at statistical analysis of the yield has been attempted. Furthermore, the plot was severely frosted on June 16, and all the tops were killed. Severe damage to the stand of some lots was incurred. The yield data on this plot for 1954 are not very reliable but are presented in Calif. table 5 to complete the report.

Calif. table 1. Kern County yield test, 1954.

Variety	<u>1/</u> Yield per acre	Solids <u>3/</u>
	Bu.	Pct.
White Rose	546	20.6
Cherokee	410	20.7
Chippewa	454	17.7
Houma	494	21.7
Kennebec	526	20.7
Pontiac	492	18.6
B 73-10	410	21.2
B 595-75	370	21.2
Red Warba	410 ^{2/}	22.2
L.S.D. 5%	38.9	
1%	52.4	

1/ Yields based on 5 replications of 1/10-acre plots.

2/ Only one replication not included in analysis.

3/ Based on specific gravity readings.

Fertilizer = ammonium sulphate at 600 lbs. per acre.

Calif. table 2. Test plot for scab resistance, Kern County, 1954.

Variety	No. tubers	No. tubers in class rating								Ave.	Marketable Pct.
		0	1	2	3	4	5	6	7		
White Rose	68	0	0	1	2	25	27	13		4.7	1.4
B 3114-52	72	2	36	27	7					1.5	52.7
B 2162-49	73	0	31	31	11					1.7	85.0
B 2920-20	68	0	24	24	15	5				2.0	70.6
B 3097-16	56	0	19	21	10	6				2.1	71.4
B 3309-2	49	0	15	18	14	2				2.1	67.3
Cherokee	67	2	17	22	18	7	1			2.2	61.2
B 3003-36	37	0	7	15	15					2.2	60.0
B 3004-9	66	4	14	18	16	13	1			2.3	54.5
B 2162-36	70	0	10	25	21	14				2.5	50.0
B 3107-17	58	1	10	15	21	9	2			2.6	44.8
B 3140-36	71	0	7	20	20	21	3			2.9	38.0
B 334-6	27	0	6	4	6	8	3			2.9	37.0
B 3003-36	46	0	4	14	12	11	5			3.0	39.1
B 3003-27	97	0	12	21	15	35	14			3.1	34.0
B 73-10	52	0	10	11	9	9	6	7		3.2	40.3
B 2879-4	45	0	0	3	29	12	1			3.2	6.6
B 2368-13	56	0	0	3	29	19	5			3.4	5.5
B 2368-11	90	0	5	17	15	31	21	1		3.5	24.4
B 3014-6	58	0	0	5	17	30	6			3.6	8.6
B 962-3	62	0	3	7	15	19	14	4		3.7	16.1
B 595-76	87	0	3	9	14	26	31	4		3.9	13.7
B 2922-26	44	0	0	1	0	22	15	6		4.1	2.2
B 2968-56	76	0	1	5	15	15	21	9		4.1	9.0
B 2874-4	91	0	0	5	18	19	25	24		4.5	5.5
B 3310-5	22	0	0	0	0	9	13			4.6	.0
B 2922-15	90	0	0	0	0	22	42	26		5.0	.0
B 2368-4	87	0	0	0	2	23	27	24	11	5.2	.0
B 3006-22	65	0	1	0	1	7	21	22	13	5.5	1.5

Key to classes of scab.

0 = free from scab
 1 = 1% of surface area covered with scab.
 2 = 5% " " " " "
 3 = 15% " " " " "
 4 = 25% " " " " "
 5 = 35% " " " " "
 6 = 60% " " " " "
 7 = 90% " " " " "

Classes 0, 1 and 2 considered marketable.

Calif. table 3. Variety yield test, San Benito County, 1954.

Variety	Yield per acre ^{1/}	Solids ^{2/}
	Bu.	Pct.
Russet Burbank	278	16.0
Alol-17	387	20.7
White Rose	302	16.9
Houma	305	18.2
Menominee	485	20.6
Sebago	408	18.6
Ontario	420	18.4
Washington Gem	317	18.2
Kennebec	492	17.7
Early Russet	265	18.2
Sequoia	530	18.6
L.S.D. 5%	58.9	
" 1%	78.8	

Size of plot = 0.12 acres.

Fertilizer = Ammonium sulphate at rate of 600 lbs. per acre.

1/ Yields based on 5 replications of 0.12 acre plots.

2/ Based on specific gravity readings.

Calif. table 4. Comparative resistance to verticillium wilt, San Benito County, 1954.

	Yield from 25 hills	Data on decline (wilt) of plants recorded as number of days after planting				Condition of plants 103 days after planting	
		1 st signs of wilt	50% wilted	50% dead	100% dead		
	Lb.						
3189-21	45.0	89	96	103	--	70% dead	X ^{4/}
A104-50	50.0	96	103	--	--	50% wilted, 30% dead	X
3191-4	49.0	96	--	--	--	10% wilted, none dead	X
A104-43	39.0	75	82	96	103	--	X
A120-2	37.0	89	103	--	--	60% wilted, 40% dead	
A104-1	49.0	96	--	--	--	30% wilted, 10% dead	X
A119-20	31.0	82	96	103	--	70% dead	X
A104-3	35.0	89	96	103	--	90% dead	
A121-1	49.0	82	89	96	103	--	X
3191-5	44.0	89	96	103	--	60% dead	
CS 6344	31.0	82	96	103	--	60% dead	
1803-3 ^{1/}	16.0	75	82	96	103	--	
B 137-5	44.0	82	89	103	--	70% dead	
B 73-10 ^{2/}	29.0	75	82	96	103	--	
B 595-76 ^{3/}	16.0	82	96	103	--	60% dead	X
A104-7	44.0	82	96	103	--	80% dead	
B 2368-4	65.0	82	89	96	103	--	X

^{1/} Yield from 16 hills

^{2/} " " 15 "

^{3/} " " 12 "

^{4/} X Sample tested for chipping
quality.

Calif. table 5. Tulelake variety yield test, 1954.

Variety	Replication <u>1</u> / number	Yield per	Solids <u>2</u> /
		acre	
		Bu.	Pct.
Russet Burbank	4	375	18.9
Houma	5	336	15.8
Sequoia	3	442	16.0
Kennebec	5	730	15.8
Cherokee	5	402	16.0
Sebago	5	222	18.6
White Rose	4	208	18.6
Ontario	3	45	17.4
Menominee	3	201	15.7
Pontiac	2	275	17.7
B 73-10	2	367	17.9

1/ Size of plot = 0.10 acre.

2/ Based on specific gravity readings

Fertilizer = ammonium sulphate at rate of 600 lbs. per acre.

CANADA
G. W. Ayers and R. V. Akeley

In Canada table 1, the reactions of various seedlings and varieties to the verticillium and storage rot organisms are given. The varieties and seedlings were increased in 1953, tested for storage rot resistance during the winter, and screened for verticillium resistance during the summer of 1954.

Exposure to verticillium wilt was accomplished by dipping the seed pieces in a spore suspension of the casual organism then planting in noncontaminated soil. The tubers for the storage rot test were wounded --also dipped in a spore suspension of the casual organism and then stored long enough at about 40°F. for the rot to become established.

The results with verticillium wilt agree in general with those found in Maine. The varieties listed as highly susceptible may be classified as equally or more wilt susceptible than Kennebec. Under commercial conditions varieties of this category would probably become seriously affected with wilt. Ontario remained completely healthy on exposure to the disease.

High susceptibility to storage tuber rot was recorded for three varieties. Their reaction would be similar to that found for Sebago tubers which have always shown high susceptibility to this disease. Varieties listed as susceptible would not likely become seriously affected under commercial handling.

Canada table 1. Varietal reaction to verticillium and storage rot organisms on Prince Edward Island, 1953-1954.

Variety	Reaction 1/	
	Wilt V. albo-atrum	Storage rot F. sambucinum f 6
B 2368-4	R	S
B 2368-11	HS	S
B 962-32	S	HS
B 595-76	S	S
B 353-35	S	R
B 355-44 (Merrimack)	S	R
B 922-6	HS	HS
B 606-37	S	S
B 926-9	S	S
X 792-88	R	S
X 792-94	R	S
Cayuga	R-S	R
Menominee	S	R
Cherokee	R-S	R
Ontario	HR	S
Teton	S	HS

1/ HR = highly resistant.
R = resistant.

HS = highly susceptible.
S = susceptible.

CONNECTICUT
Arthur Hawkins

Potato Variety Tests in Connecticut, 1954^{1/}

Two yield tests were conducted by the Storrs Agricultural Experiment Station, Storrs, Conn., on commercial potato farms in the Connecticut River Valley in Connecticut in 1954. Experimental procedures and observations on tubers are indicated in footnotes to the tables of yields.

The moisture supply was relatively unfavorable until July 29, necessitating irrigation, after which there was an ample to excessive moisture supply, especially with hurricanes of August 31 (1.9 inches) and September 10 (3.4 inches).

Vines at location 2 were inadvertently killed by the grower on September 12 along with commercial acreage, thus resulting in lower relative yields of later varieties.

Saco under Connecticut conditions produces irregular to knobby tubers. Merrimack is also irregular in shape but of high specific gravity. Of the three newly named varieties, Delus produces a more desirable shaped tuber under Connecticut Valley conditions. Early Gem in addition to being low in specific gravity and very subject to growth cracks is not outstanding in yield performance. B 920-7 is also low yielding and susceptible to growth cracks. B 355-35 was subject to developing internal drought spot at both locations.

^{1/} Seed supplied through cooperation of R. V. Akeley, Horticulturist, Division of Vegetable Crops and Diseases, U.S.D.A., Presque Isle, Maine.

Conn. table 1. Yields and specific gravity of potato varieties and seedlings at Windsorville, Conn., 1954*.

Variety or seedling	Total yield per acre	Yield per acre--over 1-7/8"				Dry matter ^{2/}
		Free of off shape ^{1/}				
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
1. Canso	574	94.7	544	94.7	544	18.6
2. Early Gem	450	95.3	429	94.0	423	15.7
3. Green Mountain	785	96.8	760	96.3	756	21.1
4. Houma ^{3/}	647	90.6	586	87.9	569	19.1
5. Katahdin	805	95.0	765	94.7	762	18.2
6. Kennebec	712	97.3	693	96.3	686	18.9
7. Russet Burbank ^{3/}	601	92.4	555	86.5	520	19.1
8. Delus	480	96.6	464	94.3	453	18.9
9. Merrimack	538	94.4	508	93.4	502	20.4
10. Saco	946	96.1	909	89.7	849	19.4
11. B 69-16	809	96.4	780	95.9	776	19.1
12. B 355-35 ^{4/}	663	95.5	633	94.8	629	18.6
13. B 595-76	567	93.4	530	91.8	521	18.9
14. B 606-37	649	96.4	626	96.1	624	18.6
15. B 920-7	413	93.5	386	89.1	368	15.8

1/ Serious off-shape removed. Saco very rough, irregular shaped, deep eyed; Merrimack very rough shape; B 69-16, B 606-37 irregular; Early Gem and especially B 920-7 high percentage growth cracks. After off-shape out, Russet Burbank fairly good to slightly irregular. Other varieties fairly good shape.

2/ Specific gravity by salt solution method. Average of 12 tubers per sample x 4 replications.

3/ Spacing: 9", except 12" for Houma; 15" for Russet Burbank.

Soil: Hartford fine sandy loam. Previous crop tobacco, rye cover.

Fertilizer: 2800 lbs. 5-8-7 band placement.

Size of Plots: 1 row 21 feet long. Replication: 4, in four randomized blocks (3 sections x 5 rows). 5 rows, no sprayer damage.

Season and Conditions: Planted May 14, 1954. Dry early part of July, but ample to excessive moisture after July 29, with hurricane heavy rains August 31, 1.9 inches, and September 10 3.4". Mostly dead by September 20.

4/ Internal discolorations in 50% of tubers of B 355-35 from slight to severe. None noted in others.

* Seed: Seed supplied through cooperation of R. V. Akeley, U.S.D.A., Presque Isle, Maine. Cut seed approximately 1½ oz.

Conn. table 2. Yield and specific gravity of potato varieties and seedlings at South Windsor, Conn., 1954*. Vine killed slightly early.

variety or seedling	Total yield per acre	Yield per acre--over 1-7/8"				Dry ² / _{matter}
		Free of off shape ¹ /				
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
1. Canso	610	88.1	537	88.1	537	18.6
2. Early Gem	479	88.8	425	86.8	416	16.4
3. Green Mountain	983	94.3	927	92.3	907	20.6
4. Houma ³ /	875	86.6	758	86.6	758	19.9
5. Katahdin	727	93.2	678	93.2	678	18.9
6. Kennebec	833	93.6	780	92.8	773	18.9
7. Russet Burbank ³ /	646	90.8	587	86.4	558	19.9
8. Delus	596	96.1	573	96.1	573	19.9
9. Merrimac	663	92.1	611	90.7	601	20.4
10. Saco	1040	94.7	985	94.7	985	19.7
11. B 69-16	705	92.4	651	91.6	646	19.4
12. B 355-35 ⁴ /	751	89.9	675	89.5	672	19.1
13. B 395-76	658	90.7	597	90.7	597	19.6
14. B 606-37	623	92.8	578	91.0	567	18.4
15. B 920-7	430	85.0	366	85.0	366	18.2

1/ Serious off-shape removed. Saco, knobby appearance; Merrimack irregular shaped; B 606-37, B 355-35, B 920-7, and Green Mountain, irregular; Early Gem, 50% growth cracks (20-25% large cracks); B 920-7 high percentage growth cracks; Russet Burbanks after severe off-shape removed (4.4%) fairly good shape with occasional mild bottle neck; Delus oval shaped as good as Katahdins; Houma (deep blossom end) small bright skin, insufficient time to develop maximum size since vines were killed relatively early.

2/ Specific gravity by salt solution method. Average of 12 tubers per sample x 4 replications.

3/ Spacing: 9", except 12" for Houma; 15" for Russet Burbank.

Soil: Hartford fine sandy loam. Previous crop potatoes, rye cover.

Fertilizer: 1200 lbs. castor pomace (5.5%) broadcast prior to planting plus 2500 lbs. 6-8-8 in row side bands.

Size of Plots: 1 row 21 feet long. Replication: 4, in four randomized blocks (3 sections x 5 rows). 5 rows, no sprayer damage.

Season and Conditions: Planted May 6, 1954. Dry early part of July but irrigated. Ample to excessive moisture after July 29. Vines killed by September 12 before vines had completed highest production.

4/ Internal drought spot found in 30% of the tubers of B 355-35 from slight to mostly moderate.

* Seed: Seed supplied through cooperation of R. V. Akeley, U.S.D.A. Presque Isle, Maine. Cut seed approximately 1½ oz.

DELAWARE
E. P. Brasher

Two variety and seedling trails were conducted at the Delaware Agricultural Experiment Station in 1954. In the first trial 18 early-planted varieties and seedlings were tested for yielding ability and dry matter content. In the second trial the potatoes were late-planted (June 23) to compare different seed sources of the newly named Delus variety and to compare home-grown seedstocks of the Delus, Irish Cobbler, and Katahdin varieties. Progenies from these 3 seedstocks will be compared with those from Maine in 1955.

The experimental procedure and conditions for the first trial were as follows:

Location: University Farm, Newark
Seed source: Maine
Soil: Sassafras loam
Previous crop: Tomato
Plot size: 3' x 25' (29 seed pieces per 25-foot row)
Plot design: Randomized block
Planting date: April 6
Fertilizer: 1400 pounds of 8-16-16 per acre in bands at planting time.
Fungicide: Zineb
Insecticide: DDT
Harvesting date: August 25
Growing conditions: Dry in July and early August

The experimental procedure and conditions for the second trial were the same as those for the first trial except that the potatoes were planted on June 23 and harvested on October 22.

The results of the first trial (see table 1) show that Kennebec and Delus significantly excelled all other varieties and seedlings tested in the production of potatoes over 1 7/8 inches in diameter. Between Kennebec and Delus there was no significant difference in yield of potatoes of this size. In percentage of potatoes over 1 7/8 inches in diameter as well as yield, Delus was far superior to Irish Cobbler and Katahdin, the varieties with which it is competing. In dry matter content the seedlings B 922-6 and B 662-3 were significantly better than any other variety or seedling tested except Keswick and B 991-14. The dry matter content of Delus was the same as that for Irish Cobbler but it was significantly greater than the dry matter content of Katahdin.

The results of the second trial are shown in Delaware table 2. These data show that Delus seedstock grown in Maine was far superior to that grown in Delaware. They also show that there was no significant difference in yielding ability among the varieties Delus, Irish Cobbler and Katahdin when all of the seedstocks were home-grown. In dry matter content, however, Delus significantly excelled among these varieties. Another interesting point is shown in tables 1 and 2. When the dry matter content of the Delus, Irish Cobbler and Katahdin varieties are compared in the early and late-planted trials, it is revealed that the potatoes from the late trials contained

the most dry matter. Since the practices followed in both of the trials were the same, it is believed that the cooler weather during the maturing season made the difference.

In the Twenty-fourth Annual Report (page 70) of the National Potato-Breeding Program it was reported that tubers of the Delus variety developed an internal breakdown after a 6-month storage period at temperatures ranging between 34° and 38° F. This past year Delus tubers showed no signs of this breakdown after 10 months of storage at temperatures 38° to 40° F.

Delaware table 1. Yield and dry matter of early-planted potato varieties and seedlings, Newark, Delaware, 1953.

Variety or seedling	Yield per acre			Dry matter
	Over 1 7/8 in.	Total	Over 1 7/8 in.	
	Bu.	Bu.	Pct.	Pct.
Kennebec	338	379	89	13.2
Delus (B73-18)	328	336	98	17.4
Katahdin	279	306	91	12.7
B 2368-4	276	297	93	14.0
B 926-9	255	296	86	13.4
Pungo	253	293	86	15.0
Mohawk	239	266	90	13.7
Irish Cobbler	234	281	83	17.4
B 73-10	233	263	89	16.0
B 605-10	224	275	82	17.0
Keswick	210	228	93	17.7
Cherokee	209	261	80	17.4
B 991-14	203	234	87	17.7
Knik*	197	226	87	14.0
Early Gem	195	212	92	15.5
B 922-6	179	221	81	17.9
B 662-3	166	196	85	17.9
B 920-7	120	188	70	17.0
L.S.D. - 5% level	26	45		.47

* Knik - Many tubers pointed and off-shape.

Delaware table 2. Yield and dry matter of late-planted potato varieties,
Newark, Delaware, 1953.

Variety	Seed source	Yield per acre			Dry matter
		Over 1 7/8 in.	Total over 1 7/8 in.		
		Bu.	Bu.	Pct.	Pct.
Delus (B 73-18)	Maine	307	320	96	18.19
Delus (B 73-18)	Home-grown	247	261	95	18.43
Irish Cobbler	Home-grown	244	274	89	17.70
Katahdin	Home-grown	237	252	94	16.71
L.S.D. 5% level		29	29	--	0.49

FLORIDA (Hastings)

A. H. Eddins

Corky Ringspot

Corky ringspot was first observed in 1946 in the Hastings section. Since then observations show that it varies in intensity from one season to the next in the same fields. For example, in 1953 48.9 percent of the Sebago tubers were affected with the disease in one area on the Potato Investigations Laboratory farm, but in 1954 when Sebago was grown in the same area tuber infection was only 5.1 percent. Furthermore, on farms where the disease caused excessive losses in 1952 and 1953, only traces of the disease were observed in 1954. These observations on the occurrence of the disease from year to year at Hastings are similar to those made in European countries where in the same fields it is reported to be severe some years and mild other years.

Susceptibility of Potato Varieties and Seedling Selections to Corky Ringspot

Fifteen U.S.D.A. potato seedling selections which had shown no symptoms of corky ringspot when grown in infested land in previous years either because they escaped the disease or were immune to it were planted in plots of infested soil in 1954. Five varieties including Sebago also were grown in the plots. Thirty-six seedpieces of each selection and variety except LaSalle were planted January 12 and fertilized with 2,500 pounds per acre of a 6-8-8 fertilizer. The potatoes were dug April 21 and graded and sorted April 22 for corky ringspot.

Total weight of tubers of each selection and variety grown in the plots and the weight of those affected with corky ringspot are recorded in Fla. table 1. A comparison of the percentage of affected tubers in each selection and variety and the percentage of Sebago tubers affected with the disease in the same block are shown in Fla. table 2.

Twelve of the 15 selections grown in 1954 were free of corky ringspot and 3 were affected. All of the varieties developed the disease. This is the fourth year that B 73-10, B 294-65, B 355-44, B 381-2, B 595-76, B 606-3, B 721-1 and B 926-6 have been grown in infested soil and developed no symptoms of the disease. None of the disease has now appeared in B 313-8 after being grown 2 years in infested soil and none in B 313-21, B 3010-4 and 3013-5 after 3 years. LaSalle and Canso developed the disease in 1954 thus proving that they had escaped infection when grown in infested soil in 1953. Russet Sebago, Red Warba, and Red Pontiac were tested for the first time in 1954 and proved susceptible to corky ringspot. Percentage tuber infection in Russet Sebago was slightly higher than in the parent variety Sebago.

Fla. table 1. Reaction of potato varieties and seedling selections to corky ringspot when grown in infested soil in 1954.

Variety or selection	Total tubers	Tubers affected
	Lb.	Lb.
B 73-10	54.2	None
B 294-65	28.0	"
B 313-8	38.6	"
B 313-21	41.9	"
B 355-44	44.7	"
B 381-2	26.6	"
B 595-76	51.9	"
B 606-3	36.1	"
B 721-1	41.0	"
B 929-6	20.5	"
B 936-12	38.8	0.3
B 962-9	35.7	2.7
B 2911-21	36.3	0.7
B 3010-4	60.7	None
B 3013-5	39.3	"
Russet Sebago	53.4	6.7
Red Warba	44.5	.8
Canso	40.4	.4
LaSalle	9.9	.3
Red Pontiac	50.2	.2
Sebago	52.2	4.0
"	47.9	5.7
"	47.8	2.8
"	48.3	1.3
"	42.9	3.9
"	53.3	.3
"	62.4	.3

Fla. table 2. Comparison of percent tubers affected with corky ringspot in different varieties and seedling selections and percent in Sebago grown in an adjacent row in the same block.^{1/}

Selection	Tubers affected with corky ringspot	Selection	Tubers affected with corky ringspot	Variety or selection	Tubers affected with corky ringspot	Variety	Tubers affected with corky ringspot
	Pct.		Pct.		Pct.		Pct.
B 73-10	None	B 606-3	None	B 3013-5	None	Sebago (check)	7.7
B 294-65	"	B 721-1	"	Rus.Sebago	12.6	"	11.9
B 313-8	"	B 929-6	"	Red Warba	1.8	"	5.9
B 313-21	"	B 936-12	0.8	Canso	1.0	"	2.7
B 355-44	"	B 962-9	7.6	LaSalle	3.3	"	9.1
B 381-2	"	B 2911-21	1.9	Red Pontiac	.4	"	.6
B 595-76	"	B 3010-4	None	--	--	"	.5

^{1/} Thirty-six seedpieces of each selection or variety were planted one foot apart in rows 40" apart except LaSalle of which only enough seed was available to plant 9 hills.

^{2/} The seedlings in each line across the table were grown in a block with a Sebago check with which they should be compared.

FLORIDA
(Indian River and Lower East Coast)
N. C. Hayslip and M. G. Hamilton

The potato crop is planted at Homestead in the winter and consists mostly of red potatoes, while the Hastings crop is planted in the spring and consists almost entirely of white potatoes.

According to reports potato chip manufacturers need a source of white potatoes during February and March. For this reason, there has been considerable interest in the potato production possibilities along the East Coast between Homestead and Hastings especially in the Indiantown area. Growing potatoes in this section might be a profitable undertaking if white-tuber varieties can be found adapted to the environment of that section.

In the 1953-1954 season 6 varieties were planted on 3 different dates at Fort Pierce and on 2 dates at Fort Lauderdale. The yield data for these tests are given in Indiantown table 1.

Indiantown table 1. Potato variety and date of planting trials at Fort Pierce and Fort Lauderdale, Fla., in 1953-1954 season.

Variety	Location and date of planting					
	Fort Pierce			Fort Lauderdale 1/		
	U.S. No. 1 per acre			U.S. No. 1 per acre		
	Oct. 24	Nov. 28	Dec. 29	Dec. 3	Jan 7	Means
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
Triumph	353	355	309	259	452	346
Red Pontiac	331	298	370	168	514	336
Red Warba	--	272	310	248	322	288
Sebago	342	290	366	140	410	310
Kennebec	273	378	328	218	471	334
Cherokee	357	323	270	239	424	323

1/. The differences in yield between planting dates at Fort Lauderdale are probably due to an excessive high water table on the December 3 planting.

There were no large differences among the 6 varieties when the means of the 5 plantings are considered. Any of the varieties with the possible exception of Red Warba produced a satisfactory yield of U.S. No. 1 potatoes.

The market quality of the varieties varied considerably. Of the red potatoes Triumph and Red Pontiac produced good quality, smooth potatoes. Red Warba was too rough. Triumph was the only one that cracked after digging. At Fort Pierce

the Sebago variety was definitely outstanding producing very smooth, uniform shallow-eyed tubers. Kennebec produced the largest smooth, shallow-eyed potatoes but they were not as desirable in shape as Sebago tubers. Cherokee produced nice white potatoes less oval in shape than Sebago. At Fort Lauderdale the Cherokee variety was outstanding, performing better than Sebago especially in the December planting.

Samples of potatoes were shipped to Gordon Foods, Inc., Atlanta, Georgia, for evaluations as chipping stock. Chips returned by Gordon Foods were judged by 12 persons. Six preferred Cherokee chips; four Sebago, and two Kennebec.

It would appear that satisfactory yields of good chipping quality, smooth potatoes may be grown to mature in February, March and April in the Indian River Lower East Coast areas in sandy soils. The importance of adequate facilities for careful water control should be kept in mind.

IOWA

A. E. Kehr, W. J. Hooker, C. E. Peterson, A. E. Schark

All of the seedling progenies, observation plots, and yield trials normally grown at Clear Lake, Iowa, were destroyed this year by spring floods. In spite of this setback, we recovered the large majority of the breeding material from other cooperating potato breeders and from the seed increase plots at Northwood, N. Dak.

Parental Material and Seed Production:

Approximately 40 parental clones were used for breeding last year. Seventeen of these lines were resistant to the common race of late blight, to virus X and to scab. Eleven parents were resistant to the common strain of late blight and scab, and two were resistant to only virus X.

Using these parents, 148 different crosses were made resulting in 300 to 20,000 seed per cross. Resistance to as many as 6 diseases has been incorporated into some of these progenies.

The parents were grown and crosses made in the greenhouse during the winter months. The photoperiod was adjusted by using artificial light for a period of 2.5 hours during the middle of the night.

Seedling Production and Screening:

Approximately 20,000 seedling plants were grown to maturity in 3" pots in the greenhouse. With few exceptions these seedlings were segregating for scab resistance with both parents carrying resistance. All of these plants were survivors of a late-blight-inoculation test in the seedling stage. Approximately one-half of the plants were also X-immune having survived a virus X inoculation in the seedling stage. About 17,000 plants from 97 different progenies survived the screening tests. Nearly 20,000 surplus tubers from these 97 progenies were distributed to cooperators who requested them in other States. All of the seedling tubers grown in Iowa last year were lost by flooding; however, most of these unselected progenies or selections from them have been made available by the cooperators to whom the excess tubers were sent.

Suitable tests for evaluating resistance to leaf roll and virus Y are being developed in order to expand the program in disease resistance.

Regional and Iowa Potato Yield Trials:

The more promising advanced Iowa selections are tested in replicated yield trials. All yields and observation tests in Iowa are conducted on scab-infested peat soils in order to test simultaneously for scab resistance and yielding ability.

Although the Uniform Regional Variety Trials were discontinued in 1954, plans have been made to continue and improve the trials in 1955. Both replicated trials and observation plots of advanced selections are included in the Regional Testing Program. Cooperators from Indiana, Iowa, Michigan, Minnesota, Nebraska, North Dakota, South Dakota and Wisconsin take an active part in these trials. These trials may include up to 3 entries from each of the cooperators, along with the check varieties Irish Cobbler, Triumph, and Katahdin. Data from all locations are summarized for yield, maturity, scab, late blight, and internal tuber characteristics.

In the case of the seedling varieties, or advanced selections sent for observation, a suggested maximum of 10 entries has been distributed by different cooperators. In the past these have not been the same at all locations. Summaries on yield, disease resistance, tuber characteristics, flesh defects, and general rating have not been standardized, and each cooperator has recorded and reported to the originator the notes and data he considered pertinent. Such information is extremely valuable to the breeders in determining the selections that should be retained for further testing or for entry in the Regional Testing Program.

After appropriate storage and conditioning treatments, all observational and yield-trial material grown in Iowa is given a chipping test at the Hyland Potato Chip Company in Des Moines, Iowa, who make their equipment available to us as a public service.

Seed Maintenance Plots:

In order to insure disease-free foundation stock of all selections in the program an isolate seed maintenance plot is grown at Northwood, N. Dak., through the cooperation of Dr. W. G. Hoyman. All accessions are indexed in the greenhouse at Ames. They are planted in tuber units in rows spaced 6 feet apart to avoid leaf and root contact, and the plots are carefully inspected and rogued throughout the season. Except for some spindle tuber in 1954 this program has proved almost 100% effective in controlling disease in the breeding material. The objective is not to make large increases of seed but to insure the best possible foundation stock in the event the decision is made to increase certain selections for more extensive trials. The seed maintenance program is a most essential feature of the overall potato-breeding project.

Leaf Roll Resistance:

Nine hundred eighty seedlings representing 16 progenies were tested for leaf roll resistance. The seedlings were planted in large onion cages and aphids carrying the leaf roll virus were released on the plants. The data for this test are given in Iowa table 1.

It is planned to enlarge these tests in the fall of 1955. Most of the 980 seedlings were screened for resistance to late blight and immunity from virus X.

Iowa table 1. Data on the leaf roll resistance tests, Ames, Iowa, 1954.

Progeny	Parents	Plants	Healthy	Leaf roll	Healthy
		inoculated		symptoms	
		No.	No.	No.	Pct.
I 1301	B 606-67 x B 2903-17	4	0	4	0.0
I 1303	I 801-10 x I 1077-16	97	2	95	2.06
I 1307	B 595-76 x I 2903-17	54	8	46	14.81
I 1311	B 2875-8 x (X927-3)	59	2	57	3.39
I 1315	B 2875-8 x B 2903-17	101	11	90	10.89
I 1332	X 927-3 x B 991-3	83	14	69	16.87
I 1333	X 927-3 x I 1077-3	81	14	67	17.28
I 1334	X 927-3 x I 1077-12	44	7	37	15.91
I 1335	X 927-3 x I 1087-1	80	10	70	12.50
I 1336	X 927-3 x B 2903-17	74	24	50	32.43
I 1344	B 2903-17 selfed	20	0	20	.0
I 1345	B 2903-17 x I 1077-3	43	4	39	9.30
I 1347	6316 x B 2903-17	57	13	44	22.81
I 1349	PI 194665 x B 2903-17	23	23	0	100.00
I 1355	X 927-3 x I 1077-16	69	14	55	20.29
I 1360	B 2903-17 x I 1077-16	97	24	73	24.74

9/3/54 Leaf roll carrying aphids released in cages.

10/28/54 Final records made.

Factors Related to Cooking Quality in Potatoes^{1/} Allen E. Scharck -----

Seven potato varieties grown in Iowa were evaluated by a taste panel of three judges to determine the relationship of specific quality of tuber samples and the mealiness of the cooked product. The varieties used were Irish Cobbler, Chisago, Red Warba, Kennebec, Triumph, Sebago, and a seedling selection X26-8. Differences between the mealiness scores for varieties developed over all specific gravity classes were highly significant. Thus, there was some factor other than specific gravity that influences the evaluation of mealiness by the judges. This factor affected all of the judges the same way since certain varieties were consistently scored high in mealiness and others were scored low. Apparently specific gravity should be used in conjunction with tests or observations in assessing mealiness of baked potatoes.

A significant linear relationship was found between mealiness scores and specific gravity of potato tubers. The relationship between specific gravity of tuber samples and mealiness scores remained constant over the range of specific gravity used in this experiment. The judges were able to discern differences at high as well as at the low range of tuber specific gravity.

^{1/} Summary of a Masters thesis conducted at Iowa State College under the direction of Dr. C. E. Peterson.

The judges did not differ significantly in their ability to score mealiness by the sensory methods used. The statistical analysis of mealiness scores show no significant difference due to judges, or to interactions of judges X varieties and judges X specific gravity classes.

Tubers of 7½ seedling selections and 9 varieties were examined for color changes before and after cooking. A general association was observed between discoloration of raw and cooked potatoes when the raw color remained white or light gray after exposure to air for 24 hours. The majority of the selections and varieties that were classified white or light gray after 24 hours exposure of the raw sliced tuber also remained white 24 hours after cooking. The color of the cooked potatoes varied from white to dark gray, from cream to dark brown and from yellowish white to greenish white. Ten seedling selections and the varieties Cherokee and New White were outstanding in the whiteness of their flesh color both cooked and raw when exposed to air for 24 hours.

Raw potato color has become important in recent years with the introduction of ready-to-cook potatoes for use by hotels and restaurants. A cooked product with light color is preferred. The data presented in this study indicate that there may be a general association between white and light gray color of raw tubers after air exposure and the color of cooked tubers after exposure. It may be possible for potato breeders to accomplish some selections on the basis of discoloration of the raw sliced potatoes exposed to air. A wide range of differences in discoloration of the raw pared tuber was observed among seedling selections. If the ability of a variety or selection to remain white after paring is of value in the processing of prepeeled potatoes, it will not be difficult to select this characteristic from populations of seedling potatoes.

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LOUISIANA
Julian C. Miller and J. R. King^{1/}

This season has been one of re-evaluation of the breeding program with the material on hand and of a slight reorganization of the objectives and goals.

Crossings were confined to the most promising advanced seedlings and well known varieties. An unusually large amount of seed was collected from the controlled pollinations.

Around 5,000 seedlings from 29 parental combinations and 34 selfs were grown in the greenhouse late in 1953, together with a similar number of seedlings grown in relation to disease resistance potentialities. From these seedlings, over 1,600 individual tubers were selected for planting in South Dakota in May.

Additional interest in the breeding work this year centered on the testing of a method of pollination and of handling pollen for pollination purposes, which is new in the field of Irish potato breeding. The method proved highly successful during the spring breeding work at Baton Rouge and at one other station in the South. It is now being made available to all Irish potato breeders. The method is rapid, and each of its several steps is easy to carry out. The plant breeder has, with this method, greater control over pollination by being able to use dated pollen (La. table 1). Stored pollens were used in a number of crosses resulting in good sets of seed balls. Pollen storage tests now under way at L.S.U. are intended to determine the optimum temperature and humidity combination for long period storage of Irish potato pollen. Preliminary tests on air shipment of viable dated pollen have been successful. These tests will be continued on a larger scale in 1955, in view of the importance to potato breeders of the future possibility of the exchange of living pollen for breeding purposes.

This spring 146 seedlings, 46 selected lines, and 7 check varieties were planted in observational, preliminary, and advanced trials at Baton Rouge. Only selections for preliminary and advanced trials were planted at New Roads, Donaldsonville, and Diamond; while advanced seedlings, alone, were grown at Hammond, Chase, and Calhoun.

^{1/} In cooperation with T. P. Dykstra of the U.S. Department of Agriculture and the National Potato-Breeding Program.

La. table 1. Crosses made at Louisiana State University, spring of 1954.

Cross	Pct. set	Age of pollen	Quality of pollen produced by anthers
Red La Soda x L92-23	9.5	2-3 days	Large
La Soda x L12-92	38.5	1-2 days	"
La Soda x L92-23	30.0	0-4 days	"
Katahdin x Cherokee	3.5	2 days	"
Triumph x USDA 1859	20.0	fresh	"
Triumph x L92-23	22.5	fresh	"
Triumph x L12-69	9.0	fresh	"
Cherokee x De Soto	3.0	3 days	"
Cherokee x Katahdin	10.0	1 day	"
Cherokee x L12-69	12.0	1 day	"
Sebago x Katahdin	6.0	3 days	"
Sebago x Neb. 26.44-1	13.3	3 days	Medium
Sheridan x L92-23	28.0	5 days	Large
L82-269 x L92-23	2.2	1 day	"
L92-23 x Katahdin	3.3	fresh	"
L92-23 x L92-167	8.0	2 days	Medium
L92-167 x L92-23	33.0	1-5 days	Large
L92-167 x L12-92	11.1	2 days	Large
L92-167 x La Soda	66.6	1 day	Large
L91-258 x Cherokee	10.0	2 days	"
L12-6 x L92-23	80.3	fresh to 1 day	"
L12-51 x USDA 1859	5.5	2 days	"
L12-69 x L12-92	46.0	2 days	"
L12-69 x USDA 1859	17.1	2 days	"
USDA 1859 x Neb. 26.44-1	1.1	2 days	Medium
USDA 606-37 x La Soda	50.0	1 day	Large

Table includes only crosses involving known varieties and most promising seedlings. It does not indicate all successful combinations made during the season. Certain combinations resulted in no set, particularly when certain selections were used as the female parent. These pollinations, which were made early in the studies reported here, do not indicate the apparent long period viability (in storage) of potato pollens, which is now becoming evident as a result of more recent tests.

These plantings in Louisiana, together with the selections in observational preliminary, and advanced trials at Clark, S. Dak., constituted the 1954 spring Irish potato field trials designated principally for a study of yield and tuber foliage characteristics. Yield data on the Louisiana plantings are given in La. tables 2 and 3 for those most promising selections which survived the elimination checks during this year's spring harvest. Certain younger seedlings, such as 22-14, 22-62, 22-153, 32-66, and 31-86, which are already exhibiting desirable characteristics, will be coming under closer observation.

La. table 2. Yield data on the most promising 4th to 7th year selections, and on varieties, tested in Louisiana in 1954^{1/}.

Variety and selection	L o c a t i o n							Average
	Baton Rouge	New ^{2/} Roads	Donald- son- ville	Dia- mond	Ham- mond	Chase	Cal- houn	
LaSoda	188.4	374.5	99.8	221.1	173.3	91.8	237.7	198.0 ^{3/}
Red Lasoda	203.3	296.0	177.9	181.8	235.0	233.0	297.3	232.0
Kennebec	171.6	236.9	129.3	179.7	219.2	-----	-----	187.3
Triumph	165.7	316.4	-----	-----	225.9	165.8	213.8	217.5
Cherokee	145.2	320.9	86.7	-----	179.7	99.3	226.8	176.4
Katahdin	216.1	320.0	118.9	-----	-----	-----	-----	218.3
Sebago	177.0	214.7	-----	-----	-----	122.0	322.6	209.0
82-94	141.6	274.6	127.5	147.6	188.6	-----	-----	175.9
81-113	81.7	255.1	137.1	133.1	144.3	-----	-----	150.2
82-269	165.2	290.5	108.0	135.7	130.8	92.4	262.8	169.3
83-274	36.3	128.0	26.3	155.4	-----	-----	-----	86.5
91-10	197.9	270.1	240.6	225.8	-----	140.3	241.7	219.4
92-23	185.2	164.3	85.3	296.2	267.9	-----	-----	199.7
91-78	118.0	231.5	164.8	145.0	-----	80.2	226.5	161.0
92-105	138.9	222.4	105.3	121.7	-----	-----	-----	122.0
91-143	135.2	255.1	69.4	137.2	-----	-----	-----	149.2
92-167	121.6	-----	-----	-----	-----	-----	-----	121.6
91-258	126.2	300.5	136.2	79.2	-----	-----	-----	160.5
01-49	164.3	-----	-----	-----	-----	-----	-----	164.3
02-51	99.8	-----	-----	-----	-----	-----	-----	99.8
02-56	127.1	-----	-----	-----	-----	-----	-----	127.1
01-128	148.9	245.1	112.5	135.7	-----	122.0	279.7	173.9
01-156	191.5	-----	-----	-----	-----	-----	-----	191.5
01-175	141.6	-----	-----	-----	-----	-----	-----	141.6
12-3	167.9	-----	-----	-----	-----	-----	-----	167.9
12-51	149.8	-----	-----	-----	-----	-----	-----	149.8
11-68	141.6	-----	-----	-----	-----	-----	-----	141.6
12-69	204.3	-----	-----	-----	-----	-----	-----	204.3
12-92	213.3	-----	-----	-----	-----	-----	-----	213.3
L.S.D. 5%	24.9	71.2	.	39.5	28.6	32.6		
1%	33.1	94.8		53.1	38.5	44.5		

1/ Data represents bu/A of No. 1 grade

2/ The decidedly higher yields at New Roads can partially be explained by the excellent soil conditions, the wide high rows, and the greater maturity of the crop.

3/ These low yields of LaSoda were mostly due to poor stands resulting from hair sprout.

La. table 3. Field data on the most promising 4th to 7th year selections, and on varieties, tested in Louisiana in 1954^{1/}.

Location of plots	Planting date	Harvest date	Plot size	Seed spacing	Reps.	Fertilization with application date
			Ft.	In.		
Baton Rouge	Jan. 26	May 11 " 14	40	12	5	800 lbs. 4-12-4 appl. 1/25; plus 200 lbs. Na No ₃ , appl. when plants mark the rows.
New Roads	Jan. 25	May 12	40	12	4	800 lbs. 4-12-4, appl. 1/29; plus 200 lbs. of Na No ₃ , appl. when plants mark the rows.
Donaldsonville	Jan. 29	April 30	40	12	4	800 lbs. 6-8-8, appl. 1/29; plus 150 lbs. Na No ₃ , appl. when plants mark the rows.
Diamond	Jan. 14	April 27	25	12	4	1,000 lbs. 5-10-5, appl. 12/17; plus 200 lbs. Na No ₃ , appl. 2/25.
Hammond	Jan. 25	May 18	40	12	5	800 lbs. 4-12-4 appl. 1/25; side dressing 40 lbs. N., appl. 2/24.
Chase	Feb. 10	June 7	25	12	5	500 lbs. 5-10-5, appl. 2/3; plus 100 lbs Na No ₃ , appl. when plants 4 inches tall.
Calhoun	Feb. 10	June 10	25	12	4	1,400 lbs. 3-12-12, appl. 2/10 side dressing 500 lbs. Na No ₃ , appl. 3/12.

^{1/} Selections and varieties referred to here are listed in table 1. Selection series 11s and 12s, 91s and 92s were harvested on May 11; series 01s and 02s, 81s and 82s were harvested on May 14.

Seed of Red LaSoda, an outstanding mutation of the LaSoda, will be available to Louisiana growers this season. This new selection is as high yielding as the LaSoda and has greater sales appeal because of its velvet, red skin.

The most promising 4-year-old red seedling is 12-92, which first warranted attention last year by its yield, smooth firm skin, good color, and tuber shape after a long overdue fall harvest. The interest in this seedling has been justified during 1954, in both Louisiana and South Dakota trials.

Red selections 92-23 and 92-167, which have been kept in the program because of their scab resistance, earliness, and the blight resistance carried by 92-167, will be retained in the future only for breeding purposes. Their inconsistency in yield and tuber shape is against their commercial acceptance.

Selections 82-94 and 82-269 continue to yield well among red lines. The latter is more consistent in good tuber size and shape, but the scab resistance of 82-94 is highly desirable for breeding purposes. Both selections will be retained for trial one more season.

Selection 92-105 has a deeper red skin and is oblong in shape. We are not as much interested in it for its possibilities in the South (where the tuber is small) as for its apparent promise elsewhere. It is considerably more promising in South Dakota than in Louisiana, both in tuber characteristics and yield.

Several advanced white-skinned high-yielding lines are very promising. Selections, 81-113 and 91-258 are high yielding, with a good tuber shape; however, a white has to be consistent in scab and/or blight resistance, as well as in these other qualities before it is of commercial value in Louisiana. Selection: 91-258 is definitely better in yield and tuber quality than is 81-113, but the latter carries blight resistance. Seedling 91-258, which is now attracting a great deal of attention, is an oblong russet potato, similar to the Russet Burbank, and is a cross between Green Mountain and Katahdin. It has done exceptionally well in many of the plantings in Louisiana, as well as in South Dakota. The South is in need of an early maturing variety which can be used for chipping and baking, and it is contemplated that this selection will fulfill these requirements. The selection is now on the increase by a number of growers and will be ready for naming and distribution by next season.

Preliminary tests were carried out this year in regard to: (1) The effectiveness of certain growth regulators in the control of sprouting of southern-grown potatoes during storage; (2) the relationship between length of rest period and yielding potential of a given variety; (3) the prevention of excessive skinning of tubers by the use of vine killers; (4) the role of antibiotics in plant growth and disease control; and (5) the relationship between seed spacing on the one hand and yield and tuber size on the other, particularly in the LaSoda variety.

MAINE

R. Bonde, F. J. Stevenson, R. V. Akeley, and D. Merriam

Comparison of Yield Rates and Specific Gravity of Ring Rot
Resistant Seedlings and Commercial Varieties

Twenty-six ring-rot-resistant seedlings and four commercially grown varieties were compared in 1954 for yielding ability^{and}/percentage solids.

The potatoes were planted about May 15 and harvested on September 24. Insect infestation and the spread of late blight were controlled by weekly applications of tribasic copper sulfate and DDT oil emulsion spray mixture.

Bonde table 1 lists the seedlings and varieties included in the test, as well as the yields and percentage solids of the tubers.

All of the seedlings included in the comparison produced tubers that possess desirable tuber type and foliage characteristics. In this experiment the Green Mountain variety produced the highest yields of potatoes with a high starch content. Kennebec, a high yielding variety with good starch content, also ranked high in this comparison. It is significant that 7 of the new ring-rot-resistant seedlings were in the same high yielding class, and 3 of these possessed high solids as well. Seedling B 446-8 was one of better appearing seedlings which produced good yield but the tubers were low in starch content. This is one of the seedlings that has been considered for possible naming and release for tests among potato growers.

It can be seen from the data that Cherokee, Katahdin, and Merrimack produced relatively low yield rates in comparison with Green Mountain, Kennebec, and the high yielding seedlings. The information shows that it will be possible to produce varieties that are resistant or immune to ring rot infection, in addition to possessing the ability to produce good yields of high quality potatoes.

Bonde table 1. Yield rate and specific gravity for 26 ring-rot-resistant seedlings. Commercial varieties included for comparison.

Stake No.	Variety or seedling	Yield per acre 2/		Solids
		Total	2" minimum	
		Bu.	Bu.	Pct.
<u>Class 1</u>				
29	Green Mountain	603	557	21.6 ^{3/}
3	B 721-29	585	512	21.6 ^{3/}
28	Kennebec	584	544	20.6 ^{4/}
25	B 2854-1	556	500	21.4 ^{3/}
2	B 446-8	556	524	18.6
4	B 991-14	543	446	18.6
23	B 919-28	539	508	18.9
8	B 2117-2	539	468	21.4 ^{3/}
18	B 2787-1	535	494	18.2
<u>Class 2</u>				
30	Cherokee	522	480	20.4
12	B 911-2	515	458	18.4
1	B 911-31	515	473	19.6
27	Katahdin	498	462	20.4
20	B 907-22	492	454	20.4
9	B 909-1	485	461	18.6
6	B 911-21 ^{5/}	470	439	19.6 ^{4/}
26	B 355-44 ^{5/}	466	430	21.4 ^{4/}
5	B 766-A	447	418	18.6
10	B 931-19	440	392	19.7
24	B 2844-1	440	385	18.9
7	B 721-1	436	387	17.8
21	B 721-48	417	361	18.0
22	B 2574-6	413	363	19.4
15	B 766-B	402	301	20.4
16	B 766-C	396	379	19.6
14	B 1161-1	395	358	19.4
19	B 2395-30	392	349	19.1
11	B 766-	379	365	19.1
17	B 1161-18	374	344	18.6
13	B 766-55	358	322	18.6
L.S.D. 5%		74.52		.88
" 1%		98.72		1.16

- 1/ Yields significantly higher as a group than group 2.
2/ Average of 5 replicated 1-row plots each 25 feet long
3/ Specific gravity significantly higher than experimental mean at 1% level. Mean is 1.07895.
4/ Specific gravity significantly higher than experimental mean at 5% level.
5/ This was recently named Merrimack.

MAINE

G. W. Simpson and Reiner Bonde

Leaf-Roll-Resistant Seedlings

Green peach aphids, fed for a time on leaf roll Katahdin plants, were again used in testing for resistance to leaf roll. In 1954 a total of 5829 tubers from the greenhouse at Beltsville were planted on Aroostook Farm and tested for the first time. Twenty-five crosses and 3 selfed lines were represented. In addition to the new seedlings and those saved for retesting, 417 selections representing a number of selections from various crosses were included in the 1954 test.

Current season symptoms of leaf roll were used to eliminate certainly susceptible varieties. On this basis, 689 (11.8 percent of the total growing) hills were saved for retesting out of the 5820 new introductions.

It is of interest that B 24-58 continues to be an outstanding source of resistance to leaf roll.

Three selections, survivors of 4 years' testing, have been saved as possible parents for further breeding.

B 1339-5 from B 514-14 selfed
B 3119-17 from B 583-66 x B 578-39
B 3119-18 from B 583-66 x B 578-39

Results since the 1951 introductions are given in the following 4 tables.

Simpson - Bonde table 1. Reaction of progenies of different crosses and selfed lines to leaf roll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 4 successive seasons, 1951-54.

Pedigree	Parentage	Seedlings planted in 1951-54 No.	Replanted			Surviving 4 years No.
			1954 No.	1953 No.	1952 No.	
B 1339	B 514-14 selfed	63	2	6	17	1
B 3119	B 583-66 x B 578-39	355	2	13	18	2

1/ 20 crossed and 2 selfed lines introduced in 1951.

Simpson - Bonde table 2. Reaction of progenies of different crosses to leaf roll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive seasons, 1952-54.

Pedigree	Parentage	Seedlings planted in 1952 ^{1/}	Replanted		Saved for retesting in 1955
		No.	1954	1953	No.
B 3292	B 579-11 x B 608-66	249	10	42	1
B 3293	B 579-11 x B 754-16	171	10	28	6
B 3295	B 579-11 x B 936-12	550	6	37	1
B 3296	X927-3 x B 936-12	77	1	17	1

^{1/} 16 crosses were introduced in 1952.

Simpson - Bonde table 3. Reaction of progenies of different crosses and selfed lines to leaf roll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 2 successive seasons, 1953-54.

Pedigree	Parentage	Seedlings planted in 1953 ^{1/}	Replanted	Saved for retesting in 1955	Surviving 2 inoculations
		No.	1954	No.	Pct.
B 1383	B 24-58 selfed	214	37	18	8.4
B 1384	B 784-53 selfed	172	51	29	16.9
B 1385	B 859-10 selfed	66	12	4	6.1
B 1386	B 864-2 selfed	308	16	1	.3
B 1388	B 2113-9 selfed	83	12	4	4.8
B 3388	B 784-53 x Katahdin	236	27	9	3.8
B 3389	B 784-53 x B 24-58	58	20	12	20.7
B 3390	B 859-10 x Katahdin	226	32	6	2.7
B 3391	B 859-10 x B 24-28	347	136	76	21.9
B 3392	B 2187-25 x Katahdin	178	11	6	3.4
B 3393	B 2187-25 x B 24-58	232	44	24	10.3
B 3394	B 864-2 x Katahdin	367	2	1	.3
B 3396	B 2113-9 x Katahdin	366	13	1	.3
B 3397	B 2113-9 x B 864-2	286	27	13	4.5
B 3400	B 24-58 x B 922-3	166	16	6	3.6
B 3484	Ac25830 x B 2429-92	51	3	1	2.0
B 3486	B 595-76 x B 24-58	121	8	3	2.5
B 3488	B 606-37 x B 24-58	70	8	5	7.1
B 3490	B 2925-23 x B 2458	72	24	16	22.2

^{1/} 24 crosses and 9 selfed lines were introduced in 1953.

Simpson - Bonde table 4. Reaction of progenies of different crosses and selfed lines to leaf roll infection resulting from artificial inoculations with viruliferous green peach aphids in 1954.

Pedigree	Parentage	Seedlings	Saved for	Surviving the
		planted in 1954	retesting in 1955	first year's inoculation
		No.	No.	Pct.
B 1419	B 24-58 selfed	104	9	8.7
B 1420	B 2938-22 selfed	346	16	4.6
B 1421	B 2962-6 selfed	145	6	4.1
B 3556	B 595-76 x B 24-58	76	2	2.6
B 3557	B 606-37 x B 24-58	154	38	24.7
B 3558	B 859-10 x Katahdin	378	35	9.3
B 3559	B 859-10 x B 24-58	337	149	44.2
B 3560	B 859-10 x B 784-53	379	110	29.0
B 3561	B 2946-5 x Katahdin	623	38	6.1
B 3562	B 2946-5 x B 24-58	246	59	24.0
B 3563	X927-3 x Katahdin	174	3	1.7
B 3564	X927-3 x B 24-58	176	17	9.7
B 3565	X927-3 x B 2834-3	350	19	5.4
B 3566	X927-3 x B 2925-23	75	3	4.0
B 3567	X927-3 x B 2946-5	213	13	6.1
B 3568	X927-3 x B 2963-7	357	9	2.5
B 3569	X1276-185 x B 2834-3	132	20	15.2
B 3570	B 2834-3 x X927-3	100	5	5.0
B 3571	Houma x B 2963-7	266	30	11.3
B 3572	Houma x X927-3	255	11	4.3
B 3573	B 962-32 x X927-3	55	7	12.7
B 3574	B 991-14 x X927-3	10	1	10.0
B 3575	B 2368-4 x X927-3	32	0	0
B 3576	B 2946-5 x B 929-32	292	28	9.6
B 3577	B 2946-5 x B 2968-31	183	20	10.9
B 3578	Imperia x B 24-58	206	39	18.9
B 3625	Houma x B 1299-15	96	1	1.0
B 3636	Katahdin x B 1172-14	60	1	1.7
		5820	689	11.8

MARYLAND

James G. Kantzes and Carroll E. Cox

1

Procedure and Results:

This work is a part of a continuing program in which potato varieties and seedlings that possess resistance to certain destructive diseases are compared with standard varieties as to their adaptability in Maryland. Early and late plots of these varieties and seedlings were sprayed with a fungicide-insecticide mixture (zineb - DDT), and yield and defoliation were compared with similar plots receiving insecticide only. The plantings were made at the University of Maryland, Vegetable Research Farm at Salisbury, Maryland.

The LaSpda seed potatoes used in these plots carried the Nebraska certification tag and the Maine seed was raised in the United States Department of Agriculture experimental plots and met all requirements for certification, although it was not officially certified. The seed from Garrett County was not certified and that from Salisbury was home grown. It represents the third generation of seed grown in unrogued plots.

Early Planting: The 30-foot single-row plots were planted on March 19, 1954, and consisted of 20 varieties and seedlings in a randomized block design of 8 replications, 4 of which were sprayed with insecticide only. All seed was planted with a mechanical planter in rows 32 inches apart with approximately 14 inches between seed pieces in the row. Fertilizer was applied at time of planting and during the growing season in accordance with the best horticultural practice in the area.

The disease- and insect-control sprays were first applied on May 1 and continued thereafter on a weekly schedule. A total of 10 applications were made and were applied with a power sprayer (approximately 350 p.s.i. at the pump) at the rate of approximately 200 gal./acre per application through a 6-nozzle-per-row boom.

Early blight was the only foliar disease present in the early plots. Although slow in developing, it became widespread as the season progressed and several weeks before harvest had severely defoliated a number of varieties and seedlings in the plots where no fungicide was applied.

The early plots were harvested on July 27. Prior to this time, observations were made in the fungicide-sprayed plots of conditions of the vines which was regarded as an indication of relative maturity of the several varieties and seedlings. The tops of Irish Cobbler died first, followed by seedlings 1276-185 and B 73-10. The varieties Marygold, LaSoda, Pontiac, and Cherokee matured next. The tops of the remaining varieties and seedlings were partially green at harvesttime. In the plots which received no fungicide, all the tops were dead, apparently as a result of early blight, with the exception of those of Merrimac (formerly seedling B 355-44) and Ontario. These were partially green when harvested.

The yields of the varieties and seedlings are presented in Maryland table 1. The varieties Pontiac, Kennebec, LaSoda, and Saco (B 606-67) produced yields of No. 1's which were significantly higher than that of Irish Cobbler from Maine-grown seed in plots sprayed with a fungicide. Only the varieties Pontiac and Pungo produced yields significantly greater than this Irish Cobbler in the plots which received no fungicide. The Irish Cobbler from Maine-grown seed produced a yield which was significantly greater than those from Maryland home-grown seed in both series of plots.

Late Planting. Twenty varieties and seedlings were planted on July 23 and planting plan and procedure were similar to those used for the early plots.

The first spray applications were made on August 24, and a total of 7 applications were made at approximately weekly intervals during the remainder of the season.

Extremely dry weather at planting time and for several weeks thereafter resulted in such poor stands of certain varieties and seedlings that their yield data are not included in Maryland table 2. Records of defoliation of all varieties and seedlings have been included in Maryland table 3.

All plots were harvested on October 23. In the plots sprayed with fungicide, Saco (B 606-67) and Marygold, and Kennebec produced yields of No. 1's which were significantly higher than that of the Irish Cobbler from Maine seed. In the plots which received insecticide only, the variety Marygold produced a significantly higher yield of No. 1's than the Irish Cobbler from Maine-grown seed.

The extent of defoliation (early blight) of all varieties and seedlings on three different dates is shown in Maryland table 3. The effectiveness of the fungicide in controlling early blight is evident from the data. The variety Merrimack (B 355-44) retained its foliage to a remarkable degree in the plots which received no fungicide. This is interpreted as tolerance to the early blight disease and confirms observations of two previous years.

Maryland table 1. Yields of potatoes in early plots at the University of Maryland Vegetable Research Farm, Salisbury, Md., 1954.

Variety or seedling	Fungicide + Insecticide ^{1/}				Seed source
	^{2/} Average yield per acre				
	U.S. #1	U.S. #2	Total	U.S. #1 total	
	Bu.	Bu.	Bu.	Pct.	
Pontiac	400	48	448	89	Maine
Kennebec	382	23	405	98	"
Saco	363	65	428	85	"
La Soda	355	33	388	92	Nebraska
Pungo	351	41	392	90	Maine
Marygold	329	45	374	88	"
B 69-16	320	32	352	91	"
Katahdin	313	52	365	86	"
Sebago	302	39	341	89	"
Cherokee	281	67	346	81	"
Irish Cobbler	274	44	318	86	"
Delus ^{3/}	273	15	288	95	"
Merrimack ^{4/}	268	33	301	89	"
B 355-35	267	50	317	84	"
B 73-10	251	28	279	90	"
Ontario	237	46	283	84	"
1276-185	174	43	217	80	Garret Co., Md.
Kennebec	163	25	188	87	Salisbury, Md.
1276-185	140	54	194	72	"
Irish Cobbler	109	40	149	73	"
L.S.D. at 5%	65	25	66		
" 1%	85	---	86		

Insecticide

Pontiac	307	49	356	86	Maine
Pungo	297	23	320	93	"
Kennebec	289	21	310	93	"
La Soda	285	31	316	90	Nebraska
Saco	274	51	325	84	Maine
Marygold	269	23	292	92	"
B 355-35	259	45	304	85	"
Merrimack	245	31	276	89	"
Katahdin	243	40	283	86	"
Delus	239	24	263	91	"
Sebago	235	33	268	88	"
B 69-16	235	28	263	89	"
Irish Cobbler	228	42	270	84	"
Cherokee	211	38	249	85	"
Ontario	187	54	241	78	"
B 73-10	182	19	201	91	"
1276-185	139	36	175	79	Garrett Co., Md.
1276-185	130	35	165	79	Salisbury, Md.
Kennebec	127	23	150	85	"
Irish Cobbler	107	32	139	77	"
L.S.D. at 5%	63	18	60		
" 1%	83	23	79		

Maryland table 1 continued

- 1/ Fungicide (zineb 2 lb./100 gal.) plus insecticide (DDT, oil emul., 1 qt./100 gal.)
2/ U.S. No. 1 and No. 2 equivalent, not officially graded.
3/ Formerly Seedling B 73-18.
4/ " " B 355-44

Maryland table 2. Yields of potatoes in late plots at the University of Maryland Vegetable Research Farm, Salisbury, Md., 1954.

Variety or seedling	Fungicide + Insecticide $\frac{1}{2}$				Seed source
	Average yield per acre				
	U.S. #1 $\frac{2}{2}$	U.S. #2 $\frac{2}{2}$	Total	U.S. #1 total	
	Bu.	Bu.		Pct.	
Saco	238	33	271	88	Maine
Marygold	227	27	254	89	"
Kennebec	224	35	259	87	"
Pungo	204	33	237	86	"
Pontiac	194	30	224	87	"
Katahdin	161	25	186	87	"
Merrimack	152	36	188	81	"
Irish Cobbler	150	62	212	71	"
Sebago	140	32	172	81	"
Kennebec	133	16	149	89	Salisbury, Md.
Ontario	108	25	133	81	Maine
Delus	104	11	115	90	"
Irish Cobbler	89	53	142	63	Salisbury, Md.
B 73-10	85	11	96	89	Maine
L.S.D. at 5%	64	20	68		
1%	86	26	92		
		Insecticide			
Marygold	222	25	247	90	Maine
Saco	199	34	233	85	"
Kennebec	180	38	218	83	"
Pontiac	170	41	211	81	"
Katahdin	152	39	191	80	"
Delus	137	28	165	83	"
Irish Cobbler	116	66	182	64	"
Pungo	114	61	175	65	"
Merrimack	113	39	152	74	"
Sebago	83	42	125	66	"
Ontario	82	25	107	77	"
Kennebec	75	18	93	81	Salisbury, Md.
B 73-10	39	16	55	71	Maine
Irish Cobbler	34	57	91	37	Salisbury, Md.
L.S.D. at 5%	86	23	85		
" " 1%	116	31	114		

- 1/ Fungicide (zineb 2 lb./100 gal.) plus insecticide (DDT, oil emul., 1 qt./100 gal.)
2/ U.S. No. 1 and No. 2 equivalent, not officially graded.

Maryland table 3. Foliage score and percentage of defoliation of sprayed^{1/} and unsprayed^{1/} late potato test plots at the University of Maryland Vegetable Research Farm, Salisbury, Md., 1954.

Variety or seedling	October 1				October 8				October 14				Seed source
	Sprayed Score defol.	Unsprayed Score defol.	Sprayed Score defol.	Unsprayed Score defol.	Sprayed Score defol.	Unsprayed Score defol.	Sprayed Score defol.	Unsprayed Score defol.	Sprayed Score defol.	Unsprayed Score defol.	Sprayed Score defol.	Unsprayed Score defol.	
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	
Saco	2.3	8	4.0	24	3.3	15	4.8	37	5.8	56	7.0	77	Maine
Marygold	2.0	6	3.8	21	2.5	9	4.8	37	4.3	28	7.5	83	"
Kennebec	2.8	11	3.5	17	3.8	21	6.0	60	6.0	60	8.3	90	"
Delus	2.8	11	3.0	12	2.8	11	4.0	24	5.3	46	6.3	65	"
Pungo	2.5	9	4.0	24	3.5	17	5.8	56	5.0	41	9.0	94	"
I.Cobbler	3.5	17	5.5	50	5.0	41	8.0	88	7.0	77	11.0	100	"
B 69-16	2.3	8	3.0	12	3.0	12	3.5	17	4.5	31	6.5	69	"
Cherokee	3.0	12	4.3	28	3.3	15	4.8	37	4.0	24	7.0	77	"
Merrimack	1.5	4	3.0	12	2.3	8	3.3	15	2.3	11	4.3	28	"
B 73-10	2.5	9	3.8	21	2.5	9	3.8	21	4.3	29	7.0	77	"
Katahdin	2.5	9	4.8	37	3.3	15	6.3	65	4.5	31	9.3	96	"
Sebago	2.8	11	4.3	28	3.0	12	4.8	37	4.5	31	6.8	74	"
Pontiac	4.0	24	5.8	56	4.5	31	7.3	81	6.8	74	9.8	97	"
1276-185	2.5	9	3.3	15	3.0	12	4.3	28	4.5	31	7.5	83	Garrett Co., Md.
B 355-35	3.5	17	4.8	37	3.5	17	5.5	50	4.8	37	8.3	90	Maine
I. Cobbler	3.8	21	5.5	50	5.3	46	7.8	86	7.8	86	10.8	100	Salisbury, Md.
Kennebec	1.5	4	3.3	15	2.3	8	3.8	21	3.0	12	6.0	60	"
Merrimack	2.5	9	3.3	15	2.3	8	3.3	15	3.3	15	4.0	24	"
1276-185	2.8	11	5.5	50	3.8	21	4.3	28	5.0	41	10.0	98	"
Ontario	3.3	15	4.5	31	3.0	12	4.8	37	4.0	24	7.0	77	Maine
L.S.D. 5%	1.2	1.0	.4	1.8	1.7	2.4							
" 1%	1.6	1.3	.5	2.4	2.3	3.2							

^{1/} - Sprayed - fungicide (zineb) plus insecticide (DDT) in all sprays.
 Unsprayed - insecticide only in all sprays.

MASSACHUSETTS

Karol J. Kucinski and Ralph W. Donaldson

Seventeen varieties of potato were tested in 1954 for comparative yields at the Massachusetts Agricultural Experiment Station, Amherst, Mass. Each variety was applied in drill. The plots were sprayed weekly using 50% wettable dithane, 2 pounds per 100 gallons supplemented with DDT as needed. Tractor and sprayer rows were eliminated since a side-arm boom was used for spraying. The 1954 growing season was considered a fairly wet year and at no time were there drought conditions. The county agent and certain farmers are interested in Saco, Merri-mack, Delus, Pungo, and Osage. The results of these tests are given in Mass. table 1.

Mass. table 1. Potato variety tests Amherst, Mass., 1954.

Total yield rank	Variety	Yield per acre		Total	Solids	Quality rank
		Size A	Size B			
		Bu.	Bu.	Bu.	Pct.	
1	Saco	819	7	826	20.2	5
2	Kennebec	740	12	752	19.5	11
3	Pungo	665	5	670	19.9	7
4	Cherokee	643	7	650	19.5	10
5	Gr. Mountain	640	10	650	21.2	2
6	Katahdin	594	7	601	19.7	8
7	Delus	577	4	581	20.5	4
8	Cobbler	541	19	560	19.7	9
9	B 2368-4	530	9	539	20.0	6
10	Sebago	510	14	524	19.4	13
11	Chippewa	496	12	516	15.7	17
12	B 69-16	503	9	511	19.4	12
13	B 355-35	496	9	505	19.2	14
14	Teton	499	3	502	21.5	1
15	Merrimack	424	6	430	21.2	3
16	Early Gem	417	2	419	16.9	16
17	B 920-7	352	11	363	18.4	15

MEXICO

Report on 1954 Toluca (Mexico) Field Test for Late Blight
Resistance of Seedlings Sent by Dr. F. J. Stevenson ^{1/}

John S. Niederhauser,^{2/} Javier Cervantes,^{2/} and Leopoldo Servin^{3/}

The test was planted June 19-24, 1954, at the Santa Elena Experiment Station, Toluca, Mexico. The material planted came from 99 different crosses, with from 3 to 207 individual seedling selections in each one. A total of 5,205 tubers were planted, each representing a seedling selection. They were planted in consecutive order (our US - 90 to US - 188), 50 cm. apart in the row. with a check plant (variety Erdgold) at the head of each row and after each 10 plants in the row. Fertilizer was applied at the time of planting - about 800 kilograms per hectarea of a 6-12-6 formula. Four applications of insecticide were made (DDT and parathion); no fungicide was used. Growing conditions were excellent.

Late blight was first seen in the test plots on July 10, although it had been noted in nearby potato fields more than 2 weeks before. The plants at this time were very small. The check plants (Erdgold) were all dead or nearly so on July 26, and had been completely killed by blight when the second reading was made on August 3. Following is a brief summary of general field notes:

July 10: Blight first seen on checks (Erdgold). Plants small, many just coming through the ground.

July 26: All checks dead or nearly so. Blight lesions on seedlings not numerous.

August 3: All checks dead from blight. Late blight general throughout the plot. No seedling completely free from blight. Many severely blighted. A few show good resistance.

August 10-15: Certain crosses have a high number of resistant plants (our US - 115, 124, 133, 134, 136, 144, 146, 147, 175, 177, 184). (For pedigrees see summary report on final blight readings.)

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^{2/} Plant Pathologist and Junior Plant Pathologist, respectively, with the Mexican Agricultural Program of The Rockefeller Foundation.

^{3/} Ingeniero Agronomo, Oficina de Estudios Especiales, Secretaria de Agricultura y Ganaderia, Mexico, D. F.

Following is a classification of the seedlings according to the final blight reading (August 10 - 15):

<u>Blight reading</u>	<u>No. seedlings</u>	<u>Pct.</u>
0	0	0.00
1 (very few lesions)	3	.06
2 (slight)	51	1.00
3 (moderate)	189	4.00
4-5 (severely blighted or dead)	4504	95.00
Total	<u>4747</u>	<u>100.00</u>
Never came up	405	
Rogued (virus)	53	
Total planted	<u>5,205</u>	

Over 200 selections were made in the material which had a blight reading of 1 to 3, and these were saved for planting in 1955. Following is a summary report on final blight readings:

Our No.	Pedigree	F.J.S. No.	Blight reading			
			1	2	3	4 - 5
90	B 24-58 x 3 VW-9	B 3673				10
91	X 96-56 x Ac 25953	B 3674			1	10
92	" x Ac 25955	B 3675				9
93	B 355-24 x Ac 25959	B 3676		2		23
94	B 779-1 x 3 VW-9	B 3677				15
95	X 792-94 x 3 VW-9	B 3678				7
96	B 922 x Cherokee	B 3679				24
97	" x X96-56	B 3680				32
98	" x Ac 25949	B 3681			2	51
99	B 922-6 x Ac 25953	B 3682		3	5	85
100	" x X96-56	B 3683			1	50
101	X 927-3 x Ac 25953	B 3684		1	2	26
102	" x 3 VW-9	B 3685		2		8
103	B 931-2 x Ac 25953	B 3686		2		67
104	B 1172-14 x Ac 25953	B 3687			1	5
105	B 2067-52 x Ac 25949	B 3688				200
106	" x Ac 25953	B 3689				95
107	" x 3 VW-9	B 3690				19
108	" x 3 XE-1	B 3691				9
109	B 2919-1 x Ac 25953	B 3692	1	1	5	58
110	" x 3 VW-9	B 3693			1	35
111	B 2997-9 x B 922-6	B 3694				4
112	B 3006-22 x Cherokee	B 3695				34
113	B 3097-16 x Ac 25959	B 3696			2	81
114	B 3114-12 x 3 VW-9	B 3697				21
115	B 3160-12 x Ac 25953	B 3698	1	7	19	124

Our No.	Pedigree	F.J.S. No.	Blight reading				
			1	2	3	4	5
116	B 3167-28 x Ac 25959	B 3699					35
117	Katahdin x Ac 25949	B 3700					57
118	" x Ac 25953	B 3701					2
119	" x 3 VW-9	B 3702					7
120	Ac 25949 x Cherokee	B 3703					57
121	" x B 922-3	B 3704			1		4
122	Ac 25953 x Cherokee	B 3705			1		56
123	" x Katahdin	B 3706					14
124	" x Ac 25959	B 3707		3	7		109
125	" x 3 XE-1	B 3708					32
126	" x HRI-1	B 3709					37
127	" x X96-56	B 3710					130
128	Ac 25953 x HJK-2	B 3711			1		7
129	" x HLT-8	B 3712		1	2		22
130	" x HSO-2	B 3713					82
131	" x 3 VW-9	B 3714			2		31
132	" x 32 U-5	B 3715			1		147
133	" x B 355-24	B 3716		1	9		140
134	" x B 922-3	B 3717		3	14		142
135	" x B 2131-3	B 3718		1	6		88
136	" x B 2331-5	B 3719			8		44
137	" x B 2997-9	B 3720			2		159
138	" x B 3160-12	B 3721			1		43
139	" x B 3167-28	B 3722			3		68
140	Ac 25955 x Cherokee	B 3723					24
141	Ac 25959 x "	B 3724		3	1		89
142	Ac. 25959 x X 96-56	B 3725			3		71
143	" x B 3160-12	B 3726			6		89
144	OB 2586-2 x Ac 25953	B 3727		6	11		100
145	" x 3 VW-9	B 3728			2		11
146	HIS-2 x Ac 25949	B 3729		6	22		108
147	HIS-2 x Ac 25953	B 3730	1	2	6		27
148	HJK-2 x Ac 25949	B 3731			2		72
149	HRI-1 x 3 VW-9	B 3732			1		24
150	HSO-2 x B 355-24	B 3733					5
151	HTM-1 x Ac 25953	B 3734			1		49
152	" x Ac 25955	B 3735					1
153	" x Katahdin	B 3736			1		18
154	" x 3 VW-9	B 3737					22
155	HZH-1 x 3 VW-9	B 3738					9
156	3 NC-9 x Ac 25953	B 3739					32
157	" x 3 VW-9	B 3740					7
158	" x B 355-24	B 3741					28
159	3 VW-9 x Cherokee	B 3742					29
160	" x Ac 25949	B 3743		1	2		121
161	" x Ac 25959	B 3744			4		68
162	" x X 96-56	B 3745			1		23

Our No.	Pedigree	F.J.S. No.	Blight reading			
			1	2	3	4-5
163	3 VW-9 x B 355-24	B 3746			2	29
164	" x B 922-6	B 3747				21
165	" x B 3160-12	B 3748				61
166	" x B 3167-28	B 3749				45
167	3 ZU-5 x Ac 25953	B 3750			2	96
168	" x 3 VW-9	B 3751				8
169	3 XE-1 x Katahdin	B 3752				7
170	" x B 355-24	B 3753				25
171	" x Ac 25949	B 3754				20
172	" x Ac 25955	B 3755				36
173	" x 3 VW-9	B 3756				40
174	Ac 25949 selfed	B 1441			1	74
175	Ac 25953 "	B 1442		1	4	59
176	Ac 25955 "	B 1443				54
177	Ac 25959 "	B 1444			8	91
178	HSO-2 "	B 1445			1	11
179	HTM-1 "	B 1446				11
180	3 YW-9 "	B 1448				24
181	3 XE-1 "	B 1450				10
182	Ac 25949 x B 922-3	B 3512		1	1	24
183	Ac 25956 x "	B 3514				13
184	Ac 25891 x 528-170	B 3516		2	10	101
185		B 922-18				3
186		B 922-6				(virus)
187		B 922-3				"
188		Ac 25953		2		0
Total			3	51	189	4,504

Notes and Summary

For the second consecutive year the seedlings sent to us by Dr. F. J. Stevenson were field-exposed to a very severe test of late blight resistance at Toluca, Mexico. No seedling was immune. Of the 4,747 seedlings read for late blight resistance, 4,504 (95%) were very severely blighted or killed. Approximately 200 selections were made from the seedlings with varying degrees of resistance.

The best sources of resistance were Ac 25953 and Ac 25949. As the season progressed, certain families of seedlings showed more field resistance than others. Eleven such superior families were noted on August 10. Ten of these families had either Ac 25953 or Ac 25949 as one parent. It is considered especially significant that these two sources of resistance were also noted as outstanding in the 1953 trials.

MICHIGAN

N. R. Thompson, H. C. Moore, C. E. Peterson

Potato breeding work in Michigan in 1953 comprised the following:

1. Seed and seedling production in the greenhouse at East Lansing.
2. Selection of new seedlings in the field.
3. Testing varieties and seedlings for adaptability in observation plots and replicated trials at Lake City and Rogers City, Mich.
4. North Central Regional Potato Trials.
5. Production of disease-free stocks of seedling progenies.

In the greenhouse at East Lansing 22 crosses were made among parent lines selected for earliness, high specific gravity, resistance to scab, late blight or fusarium. The seed produced will be held for 1955 planting.

In July approximately 20,000 seeds were sown in the greenhouse. Several flats were screened for resistance to late blight. Some 1,400 tubers are available for field trials. Additional screening tests will be incorporated for the appropriate seedlings.

Approximately 8,000 new seedlings were planted in the scab nursery. Excessive moisture early in the season resulted in a poor stand and interfered with cultivation. As a result, only 70 progenies were selected. A total of 1950 seedling lines was observed in the adaptation plots at Lake City and 300 at Rogers City.

In over-State variety trials, Early Gem, Bl36-3, Cherokee, Kennebec, and Sebago were planted in 6 locations. The seedlings Bl36-3 produced the highest yields of marketable potatoes. However, there was considerable variation in the total solids content of this seedling in the different locations.

Seven hundred bushels of Bl36-3 was planted in the Bay City area for the August market. This seedling is preferred over Irish Cobbler by some growers because of its higher yield and scab tolerance.

MINNESOTA (Duluth)

Ralph S. Grant

Ten named or numbered varieties were grown in a yield test at the North-east Experiment Station, Duluth, Minn., in 1954. The varieties were planted in 4 randomized blocks. The rows were 130 feet long planted 3 feet apart. The fertilizer was broadcast in the spring of 1954 at the rate of 60 pounds of nitrogen, 125 pounds of P_2O_5 , and 125 pounds of K_2O per acre. Water damage resulted in low yields. Some of the rows were partly drowned out. The data for these tests are given in Duluth table 1.

Kennebec ranked first in yield but not significantly higher than Sebago, B 355-35 or B 2368-4.

Duluth table 1. Potato variety test, Duluth, Minnesota, 1954.

Variety	Yield per acre saleable 1 7/8" minimum	
	Bu.	Pct.
Delus (B 73-18)	132	88
Pungo	131	84
Sebago	167	87
Kennebec	207	87
Cherokee	139	85
Saco (B 606-67)	140	80
Early Gem	95	71
Katahdin	140	86
B 355-35	156	81
B 2368-4	168	85
L.S.D. 5% level	52	
" 1% "	70	

MINNESOTA

Department of Horticulture

F. A. Krantz
F. I. Lauer
F. A. Gowen

Department of Plant Pathology

C. J. Eide
H. D. Thurston
C. H. Livingstone

Races of Late Blight

In addition to the four races of *Phytophthora infestans* previously isolated in Minnesota (0; 1; 4; 1, 4) a fifth (2,4) was isolated during the course of the greenhouse work. This isolate appeared on selection 3AB-2 inoculated with a single-zoospore isolate of race 0. Since 3AB-2 carries the R_2 gene, it was thought at first that the new race might be 2. Further tests showed that DXD-3 (R_4) and 3XX-4 (R_2R_4) to be susceptible, so the isolate was identified as 2,4.

Seedling Families

Approximately 8,000 seedlings were grown in the greenhouse. Of these, about 6,000 were tested in the seedling stage with the 4 races of late blight found in Minnesota. Each family was tested with one or more of the races, depending upon the genotype of the parents. Thus, families having both the R_1 and R_2 gene were tested with a mixture of all races. Of 615 tested, 194 survived. Families having parents with the R_1 gene consisted of 1,679 seedlings of which 1,276 apparently carried the R_1 gene for resistance. Families with parents having the R_2 or the R_2R_4 genes consisted of 1,589 seedlings, of which 948 carried either the R_2 or R_4 or both. Parents of 38 of the 47 crosses tested for late blight resistance were also resistant to scab. The 2,000 seedlings not tested for late blight came from scab-resistant parents.

Selections in screening tests number 714. They are grouped in Minn. table 1 according to their resistance to scab, late blight, and virus X. This grouping is used to facilitate sub-tests in the field for disease resistance in each of the 4 major field tests. Thus, test IV, with 153 inbred selections, had 128 selections which are field-tested either for scab or late blight or resistance to both diseases. These inbred selections represent an attempt to fix resistance to scab or late blight or both with other desirable characters. The 561 cross-bred selections are in the progressive screening test III, II, and I. These selections are with one exception resistant to one or more of the 3 diseases. Most of the selections including these resistant to late blight and virus X have scab resistance. The exceptions are, as indicated in Minn. table, 25 selections in the initial test (III) immune to virus X, and 17 in test II, and 2 in test I which have only late blight resistance.

Species Hybrids

Hybrids from *Solanum tuberosum* crossed with *S. demissum*, *S. stoloniferum*, *S. chacoense*, *S. phureja*, and *S. rybinii* are being studied. Most of the material does not enter the regular selection and screening tests. Thirty-one selections are in the initial test III. These are designed as group 8.

This group is sub-headed, according to the resistance of the parents to diseases (scab and late blight, and to insects). The species *S. demissum* and *S. stoloniferum* have late blight resistance, *S. chacoense* insect resistance, and *S. rybinii* and *S. phureja* offer possibilities of securing an improved chromosome balance in crosses of *S. tuberosum* with *S. demissum*. Most of these species crosses give considerable hybrid vigor and are being studied as a possible source of increased heterosis. Two lots of *S. demissum*, P.I. 160221 and 161,181, behaved as inbreds. When crossed with each other, a highly vigorous F_1 , exceeding either parent, was obtained. n P.I. 197767 (*Epicure* x 4n *chacoense*) crossed with a scab-resistant *tuberosum* gave a progeny which showed distinct resistance to leafhoppers. The distribution of the selections in Minn. table 1 indicates the main lines of emphasis in the potato-breeding work. The table does not include the material grown in the nursery and that grown for research studies.

Minn. table 1. Distribution of selections according to resistance to scab, late blight, and virus X, and the progressive screening tests.

Group designation	Resistance	Test IV inbred selections	Test III initial test of individual plant selections	Test II adaptation test, 6 locations	Test I advanced selections 6 locations
		No.	No.	No.	No.
2	None	25	0	0	1
1	Scab	74	62	110	10
3	Late blight	14	0	17	2
4	Immune virus X	0	35	0	0
5	Semi-resistant to all 4 races of LB	11	0	17	0
13	Combine resistance of groups 1 and 3	25	84	94	0
15	Combine resistance of groups 1 and 5	4	21	28	5
135	Combine resistance of groups 1, 3 and 5	0	0	7	0
145	Combine resistance of groups 1, 4 and 5	0	37	0	0
8	Species hybrids. Scab, late blight, insects	0	31	0	0
	Total	153	270	273	18

In Minn. table 2, the maturity, yield, and set per hill are given for the selections which have been in the advance tests for a number of years. The varieties and selections are listed according to maturity.

Minn. table 2. Maturity, yield, and number of tubers per hill of advanced selections.

Variety or selection	Green fo- liage at harvest	East Grand Forks	Crooks- ton	Castle Danger	Hollan- dale	Ave. yield at 4 locations	Average No. of tubers per hill, 4 locations	Mean yield 5 locations 1953
	Pct.	Bu.	Bu.	Bu.	Bu.	Bu.	No.	Bu.
Waseca	10.6	204	237	303	276	255	3.9	239
Minn. 355	13.7	197	243	345	342	281.7	5.0	301
Minn. 12	16.2	261	300	288	258	276.7	4.1	267
Minn. 6-3	21.8	216	245	288	246	248.7	3.8	255
Minn. 20	36.2	228	318	366	354	316.5	4.5	273
Chisago	36.8	228	240	336	275	269.7	4.0	275
Minn. 1	37.4	222	219	345	153	234.1	3.7	240
Minn. 24	45.6	264	240	348	261	278.2	4.3	248
Minn. 358	48.7	270	246	357	342	303.7	6.2	337
Minn. 119	48.7	273	270	330	273	286.5	4.9	313
Minn. 18	55.6	216	225	318	294	263.2	4.7	286
Red Pontiac	72.0	288	291	366	417	340.5	5.2	282
Minn. 11	72.5	297	241	360	228	281.6	4.9	340
Cherokee	75.0	339	321	327	333	325.0	6.2	279
Kennebec	97.1	291	222	318	177	252.0	3.7	287

1/ Average at Crookston and Grand Forks

The first column gives the average percentage of green foliage at East Grand Forks and Crookston at the time of harvest. The range was from 10.6% for Waseca to 97.1% for Kennebec. At the other 3 locations the harvest was either too early or too late to show the range in the test. Four randomized blocks were used at each location, except Hollandale (2 blocks). This is partly responsible for the apparently wider differences in yield between the selections at Hollandale. Selections 355, 12, and 6-3 approach the Waseca in early maturity and are equal or better in yield than the Waseca. Of these 3 selections, S-355 with resistance to common late blight and S-12 with moderate resistance to scab offer the most promise. Selection 20 which matures about the same time as the Chisago yielded higher than any other selection with earlier maturity than Red Pontiac. It is the most promising of this group, being highest in the test to table and market qualities. Selection 11 matures at approximately the same time as the Red Pontiac. Its yield was about the same as Red Pontiac except at Hollandale. In previous years its yield was good at this location, and its yield at all locations has been about the same as the Red Pontiac. Kennebec produces a vigorous vine growth in these tests, and if the growing season were longer would give a correspondingly

high yield. In the last column of Minn. table 2 the 1953 yields are given. there are some changes in rank between the 2 years, but the high-yielding group is about the same in both years.

The average set of tubers per hill may be of interest. The average set for the 4 blocks at each location was 4.5, 5.0, 4.3, and 4.5 at Grand Forks, Crookston, Castle Danger, and Hollandale, respectively. This locational difference was small compared with the varietal difference which ranged from 3.7 to 6.2.

The results obtained in an interregional test at Duluth is given in Minn. table 3. The varieties are listed according to the percentage green foliage at harvest. All the selections produced a yield equal to or higher than that of Cobbler and Katahdin. Selection BP 501-8 had the highest tuber set, with 5.7, followed by Minnesota 11, with a set of 5.2. The rest had a moderate set, ranging from 3.4 to 4.6. The specific gravity was about medium, ranging from 1.077 to 1.090. The 4 North Dakota entries were susceptible to scab, the other 7 entries had good resistance. The yield given is U.S. #1 grade. No grade defects were found except undersize. The number of these was insignificant except for selection BP 501-8 in which the number was not excessive. No difference in market quality between the selections and Katahdin was obtained except Minnesota 18 which was rated slightly lower. All rated higher than Irish Cobbler.

Minn. table 3. Results obtained in North-central Inter-Regional test at the Northeast Branch Station, Duluth, Minn., 1954.

Variety or selection	Green fo- liage at harvest	Yield per 200 hills per block (Over 1 7/8" diameter)					Tubers per hill	Total solids	Scab rating Grand Rapids	
		I	II	III	IV	Ave. of 4 blocks			Sever- ity	Cover- age
	Pct.	Lb.	Lb.	Lb.	Lb.	Lb.	No.	Pct.		
ND 457-116	7	188	311	238	276	253.2	3.7	20.8	5	Medium
Cobbler	9	211	215	282	224	233.0	4.2	19.1	5	Heavy
W 1429	20	293	216	363	240	278.0	4.2	21.1	0	0
W27.50	38	225	341	290	328	296.0	4.2	19.6	0	0
Minn. 1	47	245	216	230	230	230.2	3.4	20.6	2	Trace
Minn. 18	55	256	230	320	247	263.2	4.4	20.4	2	"
Minn. 11	56	210	378	337	357	320.5	5.2	21.9	1	"
ND 2231-2	56	226	322	260	241	262.2	3.7	21.4	5	Medium
ND 2124-20R	58	275	280	295	275	281.2	4.4	21.4	5	Trace
Katahdin	70	215	282	244	150	222.7	3.7	21.6	-	--
W 0103.51	80	288	230	330	275	280.7	4.6	19.9	2	Trace
BP 501-8	88	280	298	275	343	299.0	5.7	19.9	1	"

MINNESOTA
Orrin C. Turnquist

Each year potato variety demonstration plots are planted in Minnesota in cooperation with commercial growers, county agricultural agents, branch experiment stations, and the state seed department. The purpose of the plots is to familiarize the grower with new potato varieties and to assist him in evaluating the varieties for use in his area. Where possible the plots are located in commercial fields and are replicated.

One hundred pounds of seed of each variety is planted in a double row with a commercial planter. Potatoes from a two-row row within the double row of each variety are weighed and graded for size. Specific gravity of the varieties is then determined for each location to get an indication of relative cooking quality.

In 1954, demonstration plots were planted at 7 locations in Minnesota. The number of varieties and replications used at each location varied. With the exception of Fisher and Grand Rapids all locations had the same 13 varieties. In the Red River Valley, plots were located at Sabin, Fisher, and Crookston. The Hollandale plot was grown on peat while the Osseo plot was grown on sand under irrigation. Other plots were located at branch experiment stations at Grand Rapids and Duluth.

The yield and percentage of No. 1 size tubers are presented in Turnquist table 1. Yields were generally higher in 1954 than in 1953. Redburt and LaSoda led the list of varieties tested at plots both years, with Redburt leading in 1954 and LaSoda in 1953. Both varieties produced attractive red tubers and created much attention at harvesttime. Although no disease resistance is claimed for these two varieties, they appeared fairly clean and free of disease the last 2 years.

Redkote again appeared as one of the better varieties. In 1954 it yielded considerably higher than the previous year, approaching the same average yield as LaSoda. Redkote appears to have good resistance against scab.

Early Gem, the new early russet variety, produced a high percentage of growth cracks and misshapen tubers except at Osseo where it responded favorably to the light soil, high application of fertilizer, and irrigation.

Osage produced the lowest yield in both years. It had good scab resistance and excellent market quality. Serious hollow heart appeared to be its greatest limitation.

Keswick was included for the first time in 1954. Yield was good but late maturity and roughness were not in its favor.

Cherokee was generally one of the best white varieties in the plots.

The dry matter of varieties is presented in Turnquist table 2. The average dry matter of all varieties tested in 1954 was lower at Hollandale and Osseo than at other locations. The varieties Irish Cobbler and Cherokee averaged the highest in dry matter, whereas Early Gem and Red Pontiac averaged the lowest in dry matter both years.

An observation scab plot was grown at Embarrass, Minn. Several selections sent out by the U.S.D.A. for uniform scab nurseries were included along with other selections and named varieties in 10-hill plots.

The observations on scab and tuber type are presented in Turnquist table 3. The red selections B 2368-13 and B 2874-4 showed high scab resistance and excellent tuber type. Selections B 2922-26 and I 803-3 had attractive white tubers and good scab resistance. B 3310-5 was an outstanding russet with good scab resistance. Of the named varieties tested, Redkote, Early Gem, Cherokee, Osage, and Ontario had no scab.

Turnquist table 1. Performance of potato varieties test in Minnesota in 1954

Variety	Location and yield per acre															
	Sabin		Fisher		Crookston		Grand Rapids		Osseo		Hollandale		Duluth		Ave. yield	
	No.1:Total		No.1:Total		No.1:Total		No.1:Total		No.1:Total		No.1:Total		No.1:Total		No.1:Total	
	yield size	%	yield size	%	yield size	%	yield size	%	yield size	%	yield size	%	yield size	%	yield size	%
	Bu.	%	Bu.	%	Bu.	%	Bu.	%	Bu.	%	Bu.	%	Bu.	%	Bu.	%
Redburt	380	97	528	95	236	94	274	84	587	99	464	95	236	95	386	309
LaSoda	355	97	508	93	269	95	289	85	534	99	349	92	187	92	356	346
Redkote	364	93	422	91	222	86	230	54	504	98	461	94	256	94	351	224
Keswick	376	97	---	---	232	96	---	---	545	99	351	97	229	97	347	---
Red Pontiac	361	98	428	90	304	91	244	70	505	98	304	96	285	96	347	296
Irish Cobbler	356	96	372	94	274	92	167	66	482	98	524	95	212	95	341	245
Kennebec	311	92	476	96	238	91	186	80	522	99	344	92	282	92	337	285
Cherokee	281	94	558	92	174	90	309	74	466	96	322	92	206	92	331	262
Waseca	281	95	469	96	184	85	126	69	544	98	464	96	207	96	325	242
Sebago	344	95	436	89	224	88	---	---	410	97	368	94	166	94	325	---
Red Bliss																
Triumph	340	98	427	90	252	92	200	76	394	97	410	95	221	95	320	249
Early Gem	295	97	---	---	248	93	175	74	472	99	366	98	222	98	296	272
Osage	272	95	---	---	177	93	185	82	434	99	303	96	211	96	264	203

Turnquist table 2. Dry matter of potato varieties tested in 1954.

Variety	Location and dry matter						Ave. dry matter	Ave. dry matter 5 locations
	Sabin	Fisher	Crooks-ton	Osseo	Hollan-dale	Duluth	1954	1953
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Irish Cobbler	21.4	21.9	21.4	19.1	17.0	21.9	20.4	19.9
Cherokee	22.3	20.8	20.2	18.7	18.1	21.7	20.3	20.9
Keswick	21.7	--	21.0	17.9	17.2	21.9	19.9	--
Kennebec	20.2	20.2	21.9	18.1	17.9	21.0	19.9	19.7
Osage	22.3	--	19.8	17.9	16.4	21.7	19.6	19.3
Red Bliss	19.5	18.1	22.7	16.6	14.0	19.8	19.5	17.8
Triumph								
Sebago	21.4	19.8	20.6	17.7	14.9	22.5	19.5	--
Redkote	21.0	20.4	22.5	16.2	16.0	20.2	19.4	17.7
LaSoda	20.0	19.8	22.9	17.2	14.7	20.8	19.2	18.0
Redburt	20.4	20.2	21.4	17.4	14.7	21.0	19.2	18.1
Waseca	19.5	20.2	20.2	17.2	15.3	19.5	18.6	17.7
Red Pontiac	19.5	19.5	21.7	16.0	13.8	19.5	18.3	17.6
Early Gem	17.9	--	21.4	17.0	14.0	19.8	18.0	16.8
Ave. dry matter for location	20.5	20.1	21.4	17.5	15.7	20.9		

Turnquist table 3. Uniform scab nursery Embarrass, Minn., 1954.

Variety	Yield per hill Tubers over 1 7/8"	Scab <u>1</u> / rating	Color	Tuber type <u>2</u> / rating
	Lbs.			
B 2368-10	1.29	0-0	R	3
B 962-3	4.70	0-0	W	4
B 2162-36	.94	0-0	R	4
B 2162-49	2.06	0-0	R	3
B 2368-4	5.09	0-0	R	2
B 2368-11	1.98	0-0	R	2
B 2368-13	3.28	0-0	R	1
B 2874-4	3.21	0-0	R	1
B 2879-4	2.49	0-0	R	4
B 2887-2	1.62	1-1	R	2
B 2920-20	3.05	0-0	W	5
B 2922-15	1.27	0-0	W	4
B 2922-26	1.03	0-0	W	1
B 2968-56	2.91	0-0	W	4
B 3003-27	3.14	1-2	W	2
B 3003-36	1.90	T-1	W	5
B 3004-9	1.83	0-0	W	3
B 3006-22	2.71	0-0	W	2
B 3014-6	3.27	1-1	W	3
B 3097-16	3.70	0-0	W	5
B 3107-17	2.92	1-1	W	1
B 3114-52	1.94	0-0	W	2
B 3140-36	2.22	0-0	W	2
B 3309-2	2.28	0-0	R	3
B 3310-5	2.27	0-0	Russet	1
B 3334-6	.86	1-2	W	2
B 595-76	1.79	0-0	W	2
B 73-10	2.70	0-0	W	5
I 803-3	2.30	0-0	W	1
Saco	4.25	1-1	W	3
Delus	2.28	1-3	W	2
Redkote	2.19	0-0	R	2
Redburt	3.16	1-1	R	2
LaSoda	2.99	2-1	R	2
Early Gem	3.15	0-0	Russet	2
Cherokee	3.34	0-0	W	2
Osage	1.85	0-0	W	2
Ontario	3.20	0-0	W	3
Red Pontiac	2.61	2-3	R	4
Irish Cobbler	2.59	3-3	W	3

1/ Scab readings given as Area and Type in that order.

2/ Type of tuber rated as follows: 1, Very good; 2, good; 3, fair; 4, poor; 5, very poor.

MISSISSIPPI

W. S. Anderson, E. L. Phillips, J. A. Campbell,
and W. W. Watson

In 1954 four named varieties were tested at four locations in Mississippi. At one place a fifth variety was tested. At State College 18 numbered selections were also tested. These selections were chosen from those developed in the southern breeding program by Dr. T. P. Dykstra and supplied by him.

At State College the plots were located on a soil classified as Kaufman fine sandy loam. Fertilizer consisted of 3,000 pounds per acre of 6-8-8, half of it broadcast a month before planting and half side-placed in the row at planting on February 8. Irrigation was supplied as needed and regular spray applications were made of DDT and a copper fungicide for pest control. Harvest was accomplished May 28.

At Newton the plots were located on a soil classified as Stough very fine sandy loam. The fertilizer consisted of a single in-the-row application of 1,500 pounds of 6-8-8 at planting time on February 10. Pest control consisted of two applications of DDT and a copper fungicide. Harvesting was on May 25.

At Crystal Springs the plots were located on a Loess soil classified as Providence silt loam. The fertilizer consisted of a single in-the-row application of 1,000 pounds of 6-8-8 at planting time on February 9. Pest controls consisted of one application of methoxychlor for insect control. Regular irrigations were supplied as needed. Harvesting was on June 4.

At Stoneville the plots were located on a sedimentary soil, classified as Deer Creek loam. The fertilizer consisted of an application of ammonium sulphate sufficient to supply 60 pounds per acre of actual nitrogen. Planting was done on February 15. Pests were controlled by applications of DDT and a copper fungicide. Irrigation was used to supply water as needed. The harvesting was done on June 7.

At all places the plots were single rows, 25 feet long, and the hills were 12 inches apart. The rows were 42 inches wide at all places except at Newton where they were 40 inches. There were 7 replications of randomized plots at State College, and 6 at the other places.

Miss. table 1 presents a summarization of the No. 1 and total yield data secured from the named varieties tested at the four locations. Yields were unusually high for the Mississippi spring crop, particularly of the No. 1 size. In No. 1 yield LaSoda on the average exceeded the others by a highly significant amount. These varieties did not produce significantly different yields at Crystal Springs. Kennebec was the lowest yielder, and disappointing in that respect at State College, Newton, and Stoneville. Red Pontiac, tested at Stoneville only, was equal to LaSoda and DeSoto and exceeded Triumph.

Miss. table 1. Average yields, Irish potatoes, at four places in Mississippi, 1954.

Variety	Yield per acre, bushels									
	State College		Stoneville		Crystal Springs		Newton		All Places	
	No.1	Total	No.1	Total	No.1	Total	No.1	Total	No.1.	Total
LaSoda	234	250	317	414	339	387	265	313	291	341
DeSoto	200	222	248	395	313	379	219	292	245	322
Triumph	210	236	230	381	292	350	240	315	244	320
Kennebec	177	195	217	284	328	369	160	206	220	238
Red Pontiac ^{1/}	---	---	288	368	---	---	---	---	---	---
L.S.D. at 5%	24		45		N.S.		63		23	
" 1%	33		62		N.S.		88		31	

^{1/} Tested at Stoneville only.

In Miss. table 2 the data show much lower No. 1 and total yields than were produced at the same location (in adjacent plots) by the named varieties listed in table 1. The longer storage period necessary for seed tubers produced in Tennessee in connection with the breeding program, compared with Nebraska-grown seed, accounts for much of this yield difference. The data do, however, supply useful information about the selections, and discarding can be done with greater confidence. Based upon vigor, season of maturity, appearance of the tubers and yield, 3 of the 18 tested this year were judged to be good enough for additional and more extensive testing. These numbers are: 1396, 4411, and 4422.

Miss. table 2. Observation test of seedling Irish potatoes, Mississippi State College, 1954. Three replicates, single-row plots, 25 feet long.

Seedling T.L. Nos.	Average yield per acre bushel			
	Parentage	No. 1	Total	Remarks
1393	148-99 x 179-26	46	58	Very early; low vigor
1396	176-26 x 179-26	102	182	Medium early; good vigor
1404	176-26 x 179-26	106	147	Medium late; good vigor
2867	Colorado 6321	45	58	Very late; discard
3058	B 2162-49	48	82	Very late; discard
3972	Pontiac x B 400-1	100	122	Medium late; good vigor
3976	Pontiac x B 400-1	69	124	Early; good vigor
4001	B 381-2 x B 56-1	27	49	Late; discard
4409	TI ₅ x B 355-24	62	84	Early; low vigor
4411	B 606-37 x B 56-1	111	153	Late; very vigorous
4413	TI ₅ x B 355-24	53	88	Early; low vigor
4420		148	181	Late; good vigor
4422	B 56-9 x B 381-2	123	175	Late; good vigor
4429	B 608-56 x B 580-20	96	123	Late; good vigor
4458	Pontiac x B 400-1	95	123	Very early; moderate vigor
4700	B 606-3 x B 96-32	57	89	Medium early; moderate vigor
4720	B 607-56 x B 355-24	148	180	Early; excellent vigor
4732	B 779-16 x B 962-32	139	182	Early; excellent vigor

NEBRASKA
H. O. Werner

The customary overall program was carried through this season. The elimination by the use of Dieldrin of tuber damage by larvae of wire worms and flea beetles and the location of 1 of the 4 trials on a farm where very severe scab infection always occurs enables us to get more dependable tests of the degree of scab resistance than has been possible heretofore.

Effective method of inducing blooming: Excellent results were obtained in getting better blooming in the greenhouse by having all vegetative parts of the plants above ground and by rubbing off all stolons or tuberous buds as they developed. This was done by planting the seed pieces in a ridge of gravel on top of an inverted 2 $\frac{1}{2}$ -inch clay pot. When the plants were about 10 inches tall the gravel was washed away to below the seed pieces. Thereafter, stolons or tubers developing at the base of the stems were rubbed off at frequent intervals.

The resulting accumulation of materials brought about good blooming in many lines that formerly bloomed little or not at all. With all lines flowers were larger and more were produced per inflorescence. Practically all the later-developing buds of each inflorescence developed satisfactory flowers. Pollen was produced in greater abundance with some fertile pollen having been produced by some lines that rarely produced any. Berries were much larger than those usually produced in the greenhouse.

An interesting byproduct was the great variety of anomalous types of tubers and tuberous growths that developed in the median and upper parts of many of the plants late in the season when axillary growths were no longer removed. Not only did tubers occur in all axils of some plants, but they also developed out of buds on a number of the inflorescences. Some of these latter tubers grew to about an inch in diameter. Another unusual aspect was the rapid tuberous-like swelling of some of the axes of plants whose growth had been stunted. This floral development ranged from inflorescences with a few aborting primordial buds to those with a few well developed flowers, on axes not over 3 inches long. There was also a distinct varietal difference in the extent to which the axillary tubers were discrete from the base of the leaf petiole. With some varieties or lines the tubers developed in a distinctly epigenous position in the axils; in others they were sunken with the base of the leaf petiole surrounding as much as half of the tuber in a receptacle-like manner. In many instances, where the old seed pieces remained intact, extensive tuber growth occurred from other buds of the seed piece.

Scab Resistance:

In the earlier years of the Nebraska program maximum concern was for attaining superior red-tuber lines that would possess greater resistance to tuber

cracking at harvesttime and be of better cooking quality than Triumph, with scab resistance as a less immediate hope. Since 1947 the major effort has been to incorporate scab resistance into the numerous superior red lines acquired earlier, especially in the 1943 and 1944 crossing program. The number of crosses utilizing scab-resistant parents was increased each year except 1950 when again more crosses for other horticultural characters were made.

The amount of progress in attaining scab-resistant red lines can be judged from the data in Nebr. table 1. Little effort has been made to produce scab-resistant white lines, so those reported have been acquired largely as a by-product of the program. Since most of the earlier sources of scab resistance have been in white tuber lines relatively few resistant red-tuber segregates were obtained until the second or third cycle of crosses when lines with some resistance and less heterozygosity for red tuber color have been available as parents.

Practically all of the earlier varieties or lines known, by American potato breeders, to have scab resistance have been used. The lines appearing with greater frequency in the resistant selections that have survived have been Jubel and several of Minnesota 5-10 red lines, with Hindenburg and Arnica contributing considerably less. Of the varieties derived from these foreign parents Cayuga, Menominee, Yampa, Ontario, and U.S.D.A. selection 528-170 (Jubel x 44537), and a number of later Minnesota inbreds, several U.S.D.A. selections, as well as a number of our Nebraska derivatives have been used. Cayuga is proving an excellent source for good type tubers of very high scab resistance and very high specific gravity but contributes poor interior color. The russet characteristic is evident in most segregates either as a scabby skin or a heavy russet. Apparently very few lines with acceptable red-skin characteristics can be obtained in the first-generation populations with Cayuga as one parent.

The desirability of subjecting seedling populations to a second year of screening in scab-infested soil for scab resistance is shown in Nebr. table 1. In 1947, 1948 and 1949 in all families with some scab-resistant parentage, single tubers were selected from each plant remaining after those with tubers of desirable horticultural characteristics had been removed. The following year these tubers were planted, as tuber units, in scab-infested land, and selections were made with special concern for scab resistance and some, but secondary concern for horticultural characteristics. Beginning with the third year all clones were screened as were those selected originally for horticultural merit.

A high percentage of lines appearing to have greatest resistance to scab surviving 4 to 6 years of testing and elimination were acquired by the method described. The number of these lines are indicated parenthetically in Nebr. table 1. All these selections have tubers of acceptable commercial quality and some have tubers of distinctly superior type. The high percentage of lines of white potatoes with this origin is due to predominant interest in Nebraska, in red-tuber lines resistant to scab, to the inevitably greater number of white tubers produced until very recently in scab crosses, and to

Nebr. table 1. Number of lines of each type of scab from progenies of 16 successive years of crossing, that are being retained in the Nebraska program for 1955 planting-- classified also by tuber color.

Year	Types of scab					Total each year
	1 Very mild	2 Mild	3 Medium	4 Severe	5 Very severe	
Red lines						
1937			1	2		3
1938			1			1
1939						0
1940					1	1
1941	1		1			2
1942			1	1	2	4
1943				5	5	10
1944			3	1	2	6
1945				1		1
1946				2		2
1947			2	2 (1)	1	5 (1)
1948		1 (1) ^{1/}	4 (3)	6 (1)	1 (1)	12 (6)
1949	1 (1)	5 (2)	11 (3)	6 (1)	1 (1)	24 (8)
1950		1	5	11	4	21
1951	2	12	14	6	2	36
1952	7	10	15	8	2	42
Total						
scab type	11	29	58	51	21	170
White lines						
1937					2	2
1938						0
1939				1		1
1940						0
1941						0
1942				1		1
1943						0
1944						0
1945						0
1946				2		2
1947		8 (6) ^{1/}	1 (1)	2		11 (7)
1948		1 (1)	1 (1)	1 (1)	1	4 (3)
1949	2 (1)	6 (5)	7 (6)	3 (2)	0	18 (14)
1950		2	4	2	1	9
1951	3	11	16	3	2	35
1952	1	5	4	2		12
Total						
scab type	6	33	33	17	6	95

1/ Parenthetical numbers are numbers of selections made during second year, in scab-infested field, from populations consisting of one tuber from each hill remaining after those with good horticultural characteristics had been selected, in families with some scab-resistant parentage.

more vigorous general screening of white lines. Because of great variation of seedling tubers at planting time in extent of completion of the rest period many clones of sufficiently early maturity for the region are discarded the first year because of their apparent lateness, which is actually due to the very late emergence of the plants. The permanent loss of such lines has been avoided by this auxilliary seedling selection program.

Types of scab on tubers of various breeding lines:

The types of scab lesions formed during recent years on various breeding lines and new varieties from various sources, as reported in Nebr. table 2, may be of special interest to breeders who produce them. The data of the 1953 and 1954 seasons are considered less subject to complications of scab diagnosis because soil insects (flea beetle and wire worm larvae, etc.) were effectively controlled by preplanting applications of Dieldrin.

Nebr. table 2. Scab type and relative tuber color throughout 4 years in western Nebraska trials with new varieties or lines from various breeders.-

Nebr. No.	Line No. or variety and source	Estimate scab type each year				Estimate interior color each year			
		1951	1952	1953	1954	1951	1952	1953	1954
A2-3.	Minn. 5-10-3-8	1 ^{1/}	1	1	1	3 ^{2/}	4	4	
A2-11	" 5-10-1-29	2	1	1	1	Y	Y	Y	
A9-2	" 41-1-7-6-1	3	2	5	-	3	2		
A32	" 5-10-3-23-2	6	4	7	5	4	5	4	4
A40	" 12-2-4-1-7-6	2	1	1	2	3	2	4	
A65	" 48-1	3	3	3	3	2	2	3	4
A72	" 18-14-2	-	3	4	3		4	4	3
A79	" 12.42-5	4	2	3	3	4	3	3	
A80	" 24.43-5-45	4	4	3	3	3	3	3	2
A81	" 24.43-6-45	5	5	5	3	4	4	3	3
A85	" 44.45-2-2-47	3	3	3	2	1	4	3	4
A86	" 44.45-5-47	3	2	2	2	3	3		3
A87	" 67.44-3-46	3	2	2	2	3			3
A88	" 101.44-4-46	3	3	3	2	3	2	2	2
A89	" 101.44-7-46	3	3	4	3	4	3	4	3
A92	" 20.20-34	-	4	5	5		3	3	4
A93	" 113.43-8-45	-	3	3	2		3	3	3
A97	" 113.43-1-45	4	5	3	4		4	5	4
A98	" 117.44-24-4	-	3	2	1		3	3	
A100	" 32.45-195-45	-	?	4	3		5	4	4
A101	" 43.43-5-48	-	?	4	4		4	2	3
A102	" 43.46-6-48	-	?	3	4		3	4	3
A104	Canso	-	4	4	5		5	4	3
A110	Minn. 41.48-11-50	-	-	5	5				2
A120	" 113-1	-	-	4	3			3	3

Nebr. table 2 continued

Nebr. No.	Line No. or variety and source	Estimate scab type each year				Estimate interior color each year			
		1951	1952	1953	1954	1951	1952	1953	1954
A127	Minn. 40.46-8-48	-	5	5	4			3	4
A133	" 19.47-2-49	-	3	4	3			4	3
A135	" 147.44-90-46	-	2	3	2			3	4
A140	" 43.46-6-48	-	-	3	3			4	4
A141	" 26.47-19-49	-	-	1	3			3	2
A143	" 1	-	-	3	2			5	3
A144	" 11	-	-	2	3			4	5
A145	" 18	-	-	2	2			5	4
A146	" 135.49-3-51	-	-	1	2			3	3
A147	" 24.48-4	-	-	3	2				
B21	" 14.39-5-40	4	5	4	4	5	4	4	4
B40	" 21	5	5	5	5	4			
B41	" 6	4	4	5	5	3		3	3
C106	Factor (Australia)	-	-	5	4		4	4	3
C107	Monak (Australia)	-	-	?	1		4	4	3
C108	Moona (Australia)	-	-	4	3		4	5	4
C109	Carnea (Potato Int. Sta)	-	-	3	3		3	4	
C110	Centifolia "	-	-	3	3		3	3	
C111				2	2		4		
D202	U.S.D.A. B 522-33	2	3	1	3		4		4
D211	" B 528-170	1-	1-	1-	1-	4	4	2	3
D292	" B 313-21	3	3	2	1	4	3	3	3
D293	" B 355-24	3	3	3	5	4	4	4	4
D302	" B 515-2	3	1	4	4	3	3	3	3
D314	" B 766-2	4	5	2	4	2	3	3	2
D315	" B 779-1	5	4	3	3	4	4	3	2
D328	" B 929-32	3	2	4	4	4	4	4	3
D349	" B 76-23	3	4	3	3	4	4	4	
D355	" B 776-2	4	5	3	4	3	3	2	2
D363	" B 929-32	4	3	3	3	4	4	5	3
D368	" B 962-26	3	3	3	3	3	5	5	4
D369	" B 962-32	4	2	2	3	3	4	3	2
D387	" B 606-67	-	5	4	3		4	4	3
D388	" B 922-3	-	2	2	1	4	4	3	
I30	Iowa 301	-	3	4	2		5	4	3
I37	" 311	-	4	4	1		Y	Y	Y
I38	" 324	"	2	4	3			Y	Y
I45	" 313	-	3	3	4		3	4	2
I49	" 318	-	3	3	4		4	4	3
I61	" 976-3	-	-	5	1				
I62	" 8168-26	-	-	4	3				2
I63	" 8168-31	-	-	4	4				Y

Nebr. table 2 continued

Nebr. No.	Line No. or variety and source	Estimate scab type each year				Estimate interior color each year			
		1951	1952	1953	1954	1951	1952	1953	1954
	ND45-11-10				5				3
	ND 888-8-12				5				4
	ND1733-3R				5				3
	ND2104-3R				3				4
	ND2124-2R				4				3
	ND2124-10R				5				1
	ND2124-16R				3				1
	Nd2188-2R				2				2
	ND2231-2				4				4
	ND2387-1				4				4
	ND2470-3				3				4
	ND2531-2R				3				3
	ND2569-4R				3				1
	Arnica		1	2	1	3	3		
	Cayuga	1	1	0	1-	3	3	4	3
	Craigs Bounty	4	4	4	5	3	4	4	4
	Canus	5			5		4	4	
	Chippewa		5				4		
	Chenango	4	5			3	3		
	Erie		5	5		3	4		
	Early Gem		1	1	1-		5		
	Jubel		1	2	1	4	4	5	5
	Flava		1	3	1		Y	Y	
	Hindenburg	1	0	2	1	5	5	4	
	Houma	4	4	5	3	4		4	4
	Kasota			4	4				2
	Katahdin		5	4	4		5	4	3
	Kennebec	4	5	4	4	5	4	3	4
	LaSalle	4	5	5	4		3	4	4
	LaSoda		4	4	5	3	4	3	3
	Marygold			3	4				Y
	Menominee		1-	3	1		4	4	3
	Mesaba				3		3	3	3
	Paranasia		0	1-	2		4		
	Pawnee	5	4	5	3	3	3	2	3
	Ontario			1-	1			4	5
	Pungo	4	3		3			4	4
	Red Pontiac	3	3	4	4			3	3
	Red Warba	4	5	5	4	4	4	4	4
	Snowdrift				4	4	4	4	4

Nebr. No.	Line No. or variety and source	Estimate scab type each year				Estimate interior color each year			
		1951	1952	1953	1954	1951	1952	1953	1954
	Triumph	5	3	4	4	3	4	4	4
	Osage				1				
	Russet Burbank				1				4
	White Cloud				3	2	3	2	2
	Yampa	3	1-	3	2	4	4	3	4
	Progress	2	1	1	1	4	4	4	3
	117.43-3	4	4	4	4	4	4	4	3
	26.44-1					4	4	3	3
	91.47-1					5	4	4	4
	154.47-2	3	2	3	3	5	4	4	4
	93.48-1	5	4	5	3	4	3	4	3
	95.48-1	4	3	3	3	4	4	3	3
	223.48-1X	2	2	1	2	3	3	3	3
	72.49-1	2	2	2	3	3	3	3	3

1/ 1 = very slight lesion; 4 = large lesion; 5 = shallow pit; and
6 to 9 successively deeper and larger pits.

2/ Estimate of interior color of tubers; 1 = very poor muddy white;
3 = intermediate white; 5 = very white.

Interior color of tubers:

Considerable difficulty has been encountered in getting good interior color in red-skin tubers. It is not suggested that there is any association between red skin color and poor interior color. Probably this situation developed because some of the scab-resistant parents and also some of the pollen parents for red skin that were used in the earlier years of the program had tubers of inferior interior color. In families in which the Cayuga has been used extensively in crosses of recent years, because of being an excellent source of scab resistance, very good tuber type and high dry matter, always a very high percentage of tubers of fair and poor interior color are produced. The data in Nebr. table 3, for clones originating before 1951, indicate that progress is being made in acquiring clones of red tubers with both high scab resistance and good interior color. This aspect will be analyzed more completely throughout the next year.

Nebr. table 3. Distribution of tubers of red and white clones of different degrees of scab resistance according to intensity of color of interior of tubers in one irrigated plot where scab was very severe in 1954.

Scab class	Types of interior white color				Total
	Excellent	Good	Fair	Poor	
Red lines					
1 Very mild	0	6	7	1	14
2 Mild	1	3	6	5	15
3 Medium	3	3	8		14
4-5 Severe		2	5		7
Total	4	14	26	6	50
White or Russet Lines					
1 Very mild	4	4	10		18
2 Mild	2	5	9		16
3 Medium		3		1	4
4-5 Severe			2		2
Total	6	12	21	1	40

Potato Chips:

The results from a chip test of tubers of 84 varieties or selections grown on dryland in western Nebraska that were held between 65° to 75° F. from harvest until testing time in mid-December are reported in Nebr. table 4.

Nebr. table 4. Number of lines of potatoes with chips of various qualities and the mean specific gravity of the tubers of each class, 1954.

Chip quality	Lines	Mean specific gravity	Range of specific gravity
	No.		
9 Very good	16	1.0887	1.082 = 1.094
8 Good	25	1.0897	1.065 = 1.100
7 Acceptable	20	1.0942	1.0785 = 1.110
6 Dubious acceptability	14	1.0885	1.0790 = 1.1170
5 Poor	7	1.0913	1.084 = 1.1065
4 Very poor	2	1.0900	no
84			

There did not seem to have been any relationship between specific gravity as a variety character and chip quality. Apparently the long continuous warm storage had a very desirable influence on the tubers of some varieties or selections because "acceptable" or "good" chips were made from some varieties that have usually been very unsatisfactory for chips. These same potatoes are being tested after a period of cold storage and reconstitution.

Darkening of Raw Potatoes:

The tubers of 82 clones that were used for the chip tests in 1954 fell into a relatively normal population distribution as to grayness of raw slices standing in air for 24 hours after cutting (Nebr. table 5-A). In the scatter tabulation of this population there appears only a slight suggestion of correlation between high specific gravity and degree of whiteness on standing. There seems to be some relationship between the maintenance of light color in raw slices and the light color of the chips made from other slices of the same tubers (Nebr. table 5-B).

Nebr. table 5. Distribution of lines used in 1954 chip tests with regard to the amount of darkening of raw slices in relation to specific gravity and chip color.

Relative rating	Desirability of color of raw slices after standing							
	3 Very dark	4	5	6	7	8	9 White	Total sp. gr. class
Specific gravity	A. Color (raw) after standing X specific gravity							
1.15 = 1.20					1			1
1.10 = 1.15							1	1
1.05 = 1.10		1		1		2		4
1.00 = 1.05				1	1	1		3
.095 = 1.00			1	1	2	1		5
.090 = .095		1	1	2	4	4	3	15
.085 = .090	1	3	6	6	8	2	3	29
.080 = .085	1	1	2	7	1	4		16
.075 = .080			-	1	2	2	1	6
.070 = .075						1		1
.065 = .070					1			1
Total								
Raw color	2	6	10	19	20	17	8	82
Chip color	B Color (raw) after standing x chip color							
			3	3	5	1	4	Total Chip class
9			3	3	5	1	4	16
8	1	2	2	8	7	4	2	26
7		3	3	1	5	6	1	19
6		1		2	3	6	1	13
5	1		1	3	2			7
4			1				1	2
Total								
Chip color	2	6	10	17	22	17	9	83

Water relations studies:

In trying to establish some techniques for dependable evaluations of drouth endurance of plants of different lines of potatoes, water relations studies were continued. In the relative turgidity studies J. A. Riddell found that varieties differed considerably in the ability of their leaves to retain a high percentage of water under drouthy conditions as during a hot after-noon or when growing on very dry soil. He has not been able as yet to develop a routine technique which can be used to evaluate varieties. When relative turgidity values were secured at 4-hour intervals throughout a 100-hour period, 1 of our advance selections, 26.44-1, was found to have significantly higher values at all times than Progress leaves. In this series lowest relative turgidity values occurred at 6 p.m. and highest at 2. a.m. Increasing losses from spherical atmometers for 24 hours ahead, as well as for short periods ahead of sampling, were found to be correlated with decreasing relative turgidity values of leaves.

Some progress was made in exploratory studies with the means of testing for variety differences in drought endurance under conditions of induced soil drouth, in correlating types of vegetative growth with drouth endurance and in evaluating the micro climatic conditions around potato plants.

Redglo introduced February, 1954:

Nebraska line 209.43-1 was released in February under the name Redglo. The parentage of this variety is:

		(Minn. 29.32-1-34	(Minn. 40.4-2-1
	(Neb. 49.40-2	{	(Katahdin
	{	{	
	{	(Minn. 5-10-3-23-2	(Lookout Mountain
Redglo	{		(Peerless
(209.43-1)	{		
	{	(Minn. 11-1-3-2	
	{		(Minn. 4-9-1
	(N.D. 176	{	(Minn. 41-17
		(Pontiac	

Under western Nebraska irrigation conditions this variety has been found to be superior to all other varieties in skin color except Dazoc. U.S. #1 grade, A-size have been greater than those of Triumph, Dazoc, and perhaps LaSoda; about the same as those of Sheridan, but slightly lower than those of Progress and Red Pontiac (see Nebr. table 5 (and later) for 1954 results.) Tuber type generally has been considered equal to that of Progress and superior to all other red varieties except Sheridan whose tubers were usually of better type. The percentage of U.S. #1 grade A-size tubers was not as great as that of Progress and Red Pontiac but greater than with other red varieties.

Tubers appear to be less susceptible to scab than those of Triumph, Dazoc, and LaSoda. The general run of tubers has been smaller than those of Triumph, LaSoda, and Red Pontiac but larger than those of the other red lines. The specific gravity of tubers is usually higher than that of Triumph, much higher than that of Red Pontiac but lower than that of LaSoda, Sheridan, and Progress. When cooked, tubers have not been as mealy but held together better when boiled than those of Triumph, LaSoda, and Red Pontiac.

It is considered satisfactory as a dryland variety in western Nebraska, especially for seed production purposes. It has not been showing up well enough in the irrigated areas of central Nebraska to warrant recommending it for there.

It produced very good crops in trials in several tests in the Gulf Coast area and in trials and commercial fields in the Hereford, Texas, area.

The Nebraska Seed Potato Certification service reports the certification of 221 acres of Redglo, producing 44,875 cwt. in 1954.

Trials of advanced lines and red varieties:

Detailed tables of data for the trials of these lines in 1953 and 1954 will soon be available in a Progress Report which will be mailed from Nebraska to all people on the mailing list for this report. Of the new Nebraska varieties, Progress is now coming to be looked to as the most desirable variety available for quality production in western Nebraska irrigated areas. Dazoc is rapidly replacing Red Warba in the central Nebraska early area and is popular in the Hereford, Texas, area. Sheridan also enjoys some popularity in these areas but it is not considered as well suited to them by the introducer as is Dazoc. The Redglo variety is discussed quite fully in another section of the report. La Soda and Red Pontiac are now enjoying popularity with growers because of tonnage, but their low market and culinary qualities may be responsible for some of the economic distress now experienced by the western Nebraska growers.

Several advanced selections being increased for probable release in 1956 or 1957 are:

- 26.44-1, a midseason red-tuber line with tubers of very good market type and high specific gravity.
- 91.47-1, a midseason line with medium-red tubers of high scab resistance.
- 223.48-1X, an early to midseason round russet with very good type tubers and very high scab resistance.

NEW HAMPSHIRE
Paul T. Blood

Twenty-four named and numbered varieties were tested for yield and percentage solids at Dover, N. H., in 1954. The potatoes were planted May 21, 1954 in rows 3 feet apart and 10 inches between plants. There were two 20-foot rows per replication and 4 replications. 1,500 pounds per acre of 8-12-12-2 fertilizer was applied. The data for yield and dry-matter content are given in N. H. table 1.

N. H. table 1. Yield and dry-matter content of 24 varieties of potatoes grown at Young Field Dover, N. H., 1954.

Variety or seedling	Yield per acre		Solids
	Over 2 in.	Under 2 in.	
	Bu.	Bu.	Pct.
Kennebec	420	31	20.4
Teton	403	52	19.7
B 926-9	400	50	18.9
Keswick	391	46	21.9
Ontario	374	62	17.8
Green Mountain	370	66	21.9
Chippewa	347	49	18.9
Russet	346	86	19.7
B 355-35	346	66	18.6
B 621-16	345	23	19.9
Canoga	339	91	20.1
Katahdin	336	38	19.7
Merrimack	325	37	20.9
46121	321	73	19.7
Canso	306	60	21.4
Cherokee	291	90	21.1
Fl4519	277	62	22.3
B962-3	272	59	21.1
Fl451	255	67	20.9
B922-6	255	70	20.4
B 447-98	241	77	19.6
B 932-9	211	128	23.2
B 966-20	202	49	16.9
I. Cobbler	188	104	19.7

Chipping test
Excellent
 Fl4519)
 Kennebec) very
 B926-9) 'light

Color Rating
Good
 Cobbler
 B 962-3
 Chippewa

Poor
 Canso
 Katahdin
 Green Mountain

Color Rating (continued)

<u>Excellent</u>	<u>Good</u>	<u>Poor</u>
B 932-9)	Cherokee	Canoga
46121)	B 621-16	Ontario
Merrimack) light	B 922-6	Teton
B 355-35)		B 966-20
Russet)		Keswick
Fl451)		B 447-98

Kennebec yielded 420 bushels per acre of U.S. No. 1 potatoes compared with 370 for Green Mountain, 336 for Katahdin, and 188 for Cobbler. Merrimack yielded nearly as much as Katahdin.

The percentage solids was relatively high for most varieties. B 932-9 ranked first with a dry-matter content of 23.2%. Ontario was last with 17.8% solids. The 24 varieties were tested for chips. N. H. table 1 gives the data for the color of the chips of each of the varieties. All of the named varieties gave the lightest-colored chips; Merrimack and Russet ranked second: The chips of Irish Cobbler, Chippewa; and Cherokee had good color; but all other named varieties produced poorly colored chips.

NEW JERSEY
John C. Campbell

Two potato variety trials were conducted by the New Jersey Agricultural Experiment Station in 1954. Sixteen varieties and thirteen USDA seedlings were compared on the Perrine farm at Cranbury and eight varieties were tested on the Dey farm at Princeton Junction.

The growing season was exceptionally dry. Rainfall at Cranbury totaled 3.99 inches for May, 1.31 for June, 1.46 for July, and 7.72 for August, 5.3 inches of which fell on August 9 and 31.

Total yields and percentage of U.S. 1's were relatively low on the Perrine farm. However, yields reached a record high on the Dey farm due, in part at least, to the application of 7" of irrigation water during the growing season.

The Kennebec variety produced the highest yields at both locations breaking all New Jersey records with an average total yield of 1,028 bushels per acre on the Dey farm.

The Manota, Early Gem, Saco, Merrimack, Delus, and seedling B 355-35 produced total yields equal to or better than Katahdin. However, Merrimack and seedling B 355-35 produced a high percentage of off-grade tubers due to jelly rot and poor shape. These varieties may produce much better under irrigation. The Kennebec, Green Mountain, and Chippewa varieties produced appreciably higher yields than did Katahdin in the test on the Lawrence Dey farm where irrigation was used.

Test at Cranbury:

Seed spacing: 10" in 36" rows.
Soil: Sassafras loam pH 4.8-5.3
Previous crop: Potatoes with rye cover crop; spring plowed.
Fertilizer: 2200# 5-10-10 at planting.
Plot size: 2 rows 65 feet long. Number of replicates varied from 3 to 1 according to amount of seed available (see N. J table 1 footnotes).
Cultural methods: Sprayed pre-emergence with dinitro for weed control. Cultivated once to ridge rows. Vines rotobeat 2 weeks before harvest. Sprayed with Basic copper and DDT for disease and insect control.
Season and conditions: Planted April 14, ample rainfall until June; very dry June, July, most of August; harvested September 28.
Seed: Seed supplied by growers and by R. V. Akeley, USDA, Presque Isle, Maine.

Test at Princeton Junction:

Seed Spacing: 9" in 34" rows.

Soil: Sassafras loam pH 5.0
 Previous crop: Wheat
 Fertilizer: 1250# 7-14-14 at planting, plus 675# 8-8-8 side-dressed before emergence 150 ammonium Nitrate 6-10-11.
 Plot size: 2 rows 150 feet long, 2 replications.
 Cultural methods: Sprayed pre-emergence with dinitro for weed control, cultivated to hill once.
 Season and conditions: Planted April 12, ample rainfall until June; very dry June, July, and August. Potatoes irrigated weekly. 1 1/3 inches per application, 7 applications; harvested October 19. Vines killed with sodium arsenite September 15.
 Seed: Same source as in Perrine test.

N. J. table 1. Yield and dry-matter content of potato varieties and seedlings at Cranbury, N. J., 1954. Spencer Perrine Farm. Not irrigated.

Variety or seedling	Source	Yield per acre			B size	Dry matter	Remarks
		Total	Over 1 7/8 diam. US #1 free off-shape				
		Bu.	Bu.	Pct.	Pct.	Pct.	
Katahdin ^{1/}	Wis.	315	255	81	11	--	2% jelly rot
Chippewa ^{1/}	Maine	296	243	82	13	14.9	2% "
Katahdin ^{1/}	Maine	286	226	79	11	13.4	4% "
Gr. Mountain ^{1/}	Maine	313	219	70	14	15.4	1% knobby 2% jelly rot
Canso ^{1/}	Maine	262	202	77	16	16.4	9% knobby 1% fusarium rot
Keswick ^{1/}	Maine	213	185	87	11	17.6	1% scab
Cobbler ^{1/}	Wis.	231	180	78	18	--	No off grade 1% blackleg
"	Maine	202	166	82	11	16.9	3% blackleg 1% knobby
Kennebec ^{2/}	USDA, Me.	439	272	62	10	--	19% jelly rot 4% knobby
"	Maine	393	318	81	8	15.6	6% jelly rot 3% knobby
Osseo ^{2/}	N. D.	226	217	96	4	16.1	No off grade
Osage ^{2/}	N. D.	169	142	84	11	16.2	"
White Cloud ^{2/}	Nebr.	215	163	76	21	17.2	"
Redkote ^{2/}	N. D.	193	108	56	29	13.2	"
Manota ^{3/}	USDA, Me.	345	321	93	6	16.4	"
Pungo ^{3/}	USDA, Me.	303	218	72	15	13.4	3% jelly rot 7% knobby
Early Gem ^{3/}	USDA, Me.	257	231	90	7	16.7	1% knobby
Cherokee ^{3/}	USDA, Me.	215	144	67	24	15.7	3% knobby
Netted Gem ^{3-4/}	USDA, Me.	197	158	80	11	16.8	3% knobby
B606-67(Saco) ^{3/}	USDA, Me.	375	--	--	--	--	

N. J. table 1 continued

Variety or seedling	Source	Yield per acre			B size	Dry matter	Remarks
		Total	Over 1 7/8" diam. US #1 free off-shape				
		Bu.	Bu.	Pct.	Pct.	Pct.	
B355-44 (Merrimack)	USDA, Me.	336	178	53	9	13.6	15% jelly rot 21% knobby and growth cracks
B 355-35	"	333	193	58	10	14.0	21% jelly rot 7% knobby
B 926-9	"	288	156	54	13	12.0	19% jelly rot 3% knobby
B 2368-11	"	285	239	84	13	13.5	No off grade
B 2368-4	"	282	245	87	9	13.3	"
B 73-18(Delus)	"	293	223	76	3	16.3	2% jelly rot 17% knobby
B 637-14	"	272	239	88	7	16.4	3% growth cracks
B 69-16	"	222	189	85	11	13.9	2% knobby
B 96-56	"	206	192	93	6	17.8	No off grade
B 922-6	"	189	142	75	19	15.7	"
B 751-119	"	183	97	53	30	14.4	3% jelly rot
B 579-3	"	182	124	68	27	17.6	No off grade

1/ Average of 3 replicates

2/ " " 2 "

3/ One plot only for all seedlings

4/ Over 1 3/4" screen. (Long varieties).

Dry matter determined by weighing 5000 gram samples in water and air.

N. J. table 2. Yield and dry-matter content of potato varieties at Princeton Junction, N. J., Lawrence Dey Farm. Irrigated.

Variety or seedling	Source	Yield per acre			B size	Dry matter	Remarks
		Total	Over 1 7/8" diam. US #1 free off-shape				
		Bu.	Bu.	Pct.	Pct.	Pct.	
Kennebec ^{1/}	Maine	1028	914	89	3	16.9	8% knobby and growth cracks 7% US #1 jumbo
Gr. Mountain	"	908	708	78	2	18.2	20% knobby
Chippewa	"	837	762	91	4	15.1	5% scab
Keswick	"	698	670	96	1	16.9	3% scab & russetted 7% US #1 jumbo
Katahdin	"	694	645	93	5	15.0	1% scab
Early Gem	USDA Maine	694	451	65	1	15.3	33% knobby and growth cracks
Canso	Maine	622	566	91	4	18.2	5% scab
Cobbler	Maine	582	477	82	7	16.6	4% growth cracks 5% scab

^{1/} Average of 2 replicates

Plots 2 rows wide 150 ft. long - two 32 ft. sections harvested from each replicate.

NEW YORK
W. C. Kelly

Ascorbic Acid Content of Potatoes

This project is now in its ninth year. Initial studies of the effect of storage on the ascorbic acid content of potatoes showed that this vitamin decreased during storage and that more ascorbic^{acid} is lost at the lower storage temperatures. This loss is rapid for the first 2 to 3 months then becomes more gradual. After 6 months of storage at 40° F. as much as 60% of the ascorbic acid content of the tubers may be lost. Although there were varietal differences in the rate of ascorbic acid loss in storage, the most important factors were time and temperature. The growing season and location had relatively little effect on the rate at which ascorbic acid was lost in storage.

A rather extensive study of the effect of environment on the ascorbic acid content of potato tubers followed. Potatoes grown at the different locations within the State and over the country varied in their ascorbic acid content. In general, varieties that were high in one location tended to be high at other locations, but there was some variety-location interaction. Large differences between varieties usually were maintained at all locations.

During growth the ascorbic acid content of the tubers increased until the tops of the plants reached their maximum size. At this stage, the ascorbic acid content of the tubers began to decrease slowly. After the tops were dead this decrease in the vitamin continued more rapidly.

Considerable time was spent studying the variations in ascorbic acid content of potatoes due to factors other than genetic ones. This was done so that a satisfactory sampling method could be devised for variety comparisons in the genetic study. When a number of potato varieties are harvested at the same time there may be some influence of maturity on the ascorbic acid content of the tubers. Thus, the varieties which mature early are relatively lower in ascorbic acid content than those maturing later. This is related to the fact that the ascorbic acid content of the tuber decreases after the tops die. Thus, at any one harvest date it is difficult to compare varieties of different maturities. Hence, the sampling method selected for the genetic study was, in effect, a compromise. Samples are taken from all the varieties under study soon after the first frost in the fall, analyzed, for ascorbic acid immediately after harvest, and after 120 days of storage at 40° F. The ascorbic acid value after a period of storage is more important since it is essential that the high ascorbic acid be maintained throughout storage and not just be present at the time of harvest. With the sampling procedure selected, there is some bias since the early maturing varieties have lost some of their original ascorbic acid content. It was not practical to attempt the project if more than one harvest had to be made.

For the last 5 years the study of the influence of genetics on the ascorbic acid content of potato tubers has been carried out in cooperation with the U.S.D.A. National Potato-Breeding Project. The breeding is done by Dr. F. J. Stevenson and associates and the potatoes are grown at the Chapman farm at Presque Isle, Maine. The potatoes are harvested in Maine and transported to Ithaca for analysis and storage. Since the material was grown in Maine it was not practical to make more than one harvest.

Initially, a survey type of approach was used. Over a hundred named varieties of potatoes were sampled over a 3-year period and analyzed for ascorbic acid. These varieties included both new and old American varieties, European varieties, and numerous selections which showed promise and had not been named. A summary of the ascorbic acid content after storage of 20 varieties of potato is presented in Kelly table 1. At the same time, a number of progenies from crosses made for other purposes were analyzed for ascorbic acid. It was found that these various progenies differed significantly in their ascorbic acid content and that it was obvious that genetics played a major role in the ascorbic acid content of potato tubers.

At the end of the 1950 season a definite program of breeding was initiated on the basis of the preliminary results with the survey type approach. The crosses were made early in 1951 and the seed from the crosses were grown in the greenhouse later in 1951. The tubers produced from these seeds were planted in Maine in 1952, and material was available for analysis that fall.

The study of progenies from other crosses was continued until the material from the planned crosses was ready for harvest. There were rather obvious differences in the ascorbic acid content of seedlings from various crosses. It was found that certain parents tended to transmit a low ascorbic acid content to their progeny regardless of the other parent. Crosses made with Chippewa or B607-56 always resulted in a progeny with a low ascorbic acid content. Material with a very high ascorbic acid content after storage was selected from the seedlings resulting from a cross of Mohawk x B 355-24. The ascorbic acid content of one of the selections from this cross, B 2098-29, was significantly higher than any commercial variety that was studied. It was planned, therefore, to use this seedling as a parent and get some information on its breeding behavior. The planned breeding program was to study the progeny from seedlings resulting from crossing B 2098-29 with varieties having either a high, low, or medium ascorbic acid content, particularly after storage. Selfed progeny of all the parents involved were also to be studied. Teton and B 607-56 were selected as low ascorbic acid parents, Katahdin and X528-170 were selected as medium ascorbic acid content parents, and B 355-24 and B 2098-5 were selected as high ascorbic acid parents. It was hoped to have at least 250 seedlings from each of the crosses. The desired number was obtained from most of the crosses, but only a few seedlings were obtained from the crosses made with the high ascorbic acid parents. It is evident from the data in figure 1 that crossing with the B 2098-29 resulted in an increased ascorbic acid content of the progeny when compared with the selfed population of the other parent.

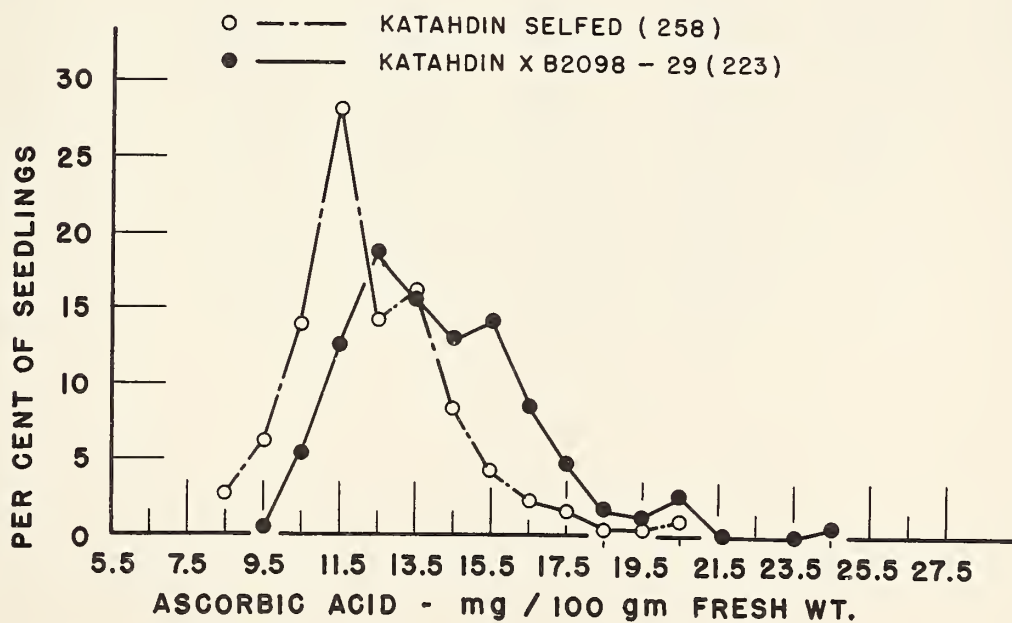
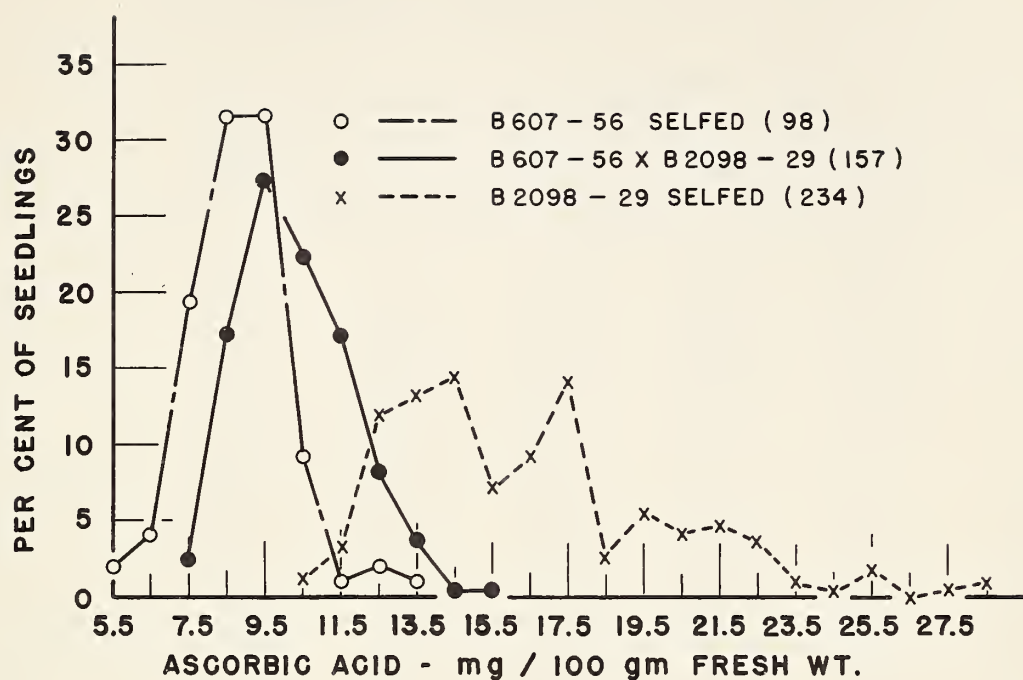


Figure 1 .--Ascorbic acid content of potato parents and progeny.

Kelly table 1. The ascorbic acid content of potato varieties after 120 days of storage at 40° F.

Variety	Year					Ave.
	1949	1950	1951	1952	1953	
Ascorbic acid - mg/100 gm fresh weight						
American Giant	16.2	12.3	19.1	14.3	16.0	15.6
Menominee	8.4	12.4	19.4	15.9	16.6	14.5
White Rose	11.1	10.8	16.5	12.7	16.5	13.5
La Soda	11.6	11.2	14.4	15.6	13.5	13.3
Mohawk	13.7	11.6	13.6	13.1	14.0	13.2
Chas. Downing	15.2	10.0	13.6	13.3	12.9	13.0
Sequoia	10.3	12.2	13.4	14.6	13.5	12.8
Cayuga	9.2	11.5	12.7	15.6	13.8	12.6
Green Mountain	10.9	9.7	12.9	12.9	12.6	11.8
Russet Rural	9.9	9.4	13.9	11.0	13.8	11.6
Katahdin	10.8	10.0	12.1	12.6	11.4	11.4
Sebago	9.6	9.5	11.5	11.5	12.7	11.0
Erie	9.2	9.1	11.2	13.2	11.4	10.8
Ontario	8.7	8.7	14.7	11.6	10.5	10.8
Earlaine	11.6	7.3	11.9	10.9	10.5	10.4
Pawnee	10.6	8.2	9.3	12.2	10.3	10.1
Triumph	7.3	9.5	10.8	12.5	9.2	9.9
Chippewa	9.0	8.6	10.0	10.4	11.1	9.8
Warba	7.9	8.7	9.2	11.9	10.3	9.6
Irish Cobbler	9.4	8.6	8.2	10.9	9.4	9.3
Teton	7.1	7.4	7.7	12.1	8.8	8.6
Yearly Ave.	10.4	9.8	12.7	12.8	12.3	

The higher ascorbic acid content of the progeny did not occur in all cases, however, thus, the cross between B 2098-29 and X528-170 resulted in a progeny which had essentially the same ascorbic acid content as the progeny of X528-170 selfed. Those parents which produced a progeny of low ascorbic acid content had a very narrow range in ascorbic acid content of the progeny. The parents transmitting a higher ascorbic acid content produced a progeny with a very wide range in ascorbic acid content. It is also evident from the curves presented in figure 1 that the populations are skewed to the low side. This may be in part due to the presence of a large number of early maturing seedlings. In the case of B2098, however, the skewing was not due to the early maturing seedlings.

That high ascorbic acid potato tubers can be produced by breeding is evident from Kelly table 2. The figures in parenthesis are the 1952 ascorbic acid content after four months' storage at 40° F.

Kelly table 2. Effect of breeding on the ascorbic acid content of one potato variety, 1952 crop, stored 4 months at 40° F.

Mohawk (13 mg)	x	B 355-24 (10 mg)
B 2098-29 (20 mg)	x	self
KB1277-1 (30 mg)		

Thus, the selection KB1277-1 has an ascorbic acid content which is almost double the ascorbic acid content of the best commercial varieties we have at present. The upper limit of ascorbic acid content in potato tubers has not been reached. New crosses are planned utilizing these materials with other combinations of varieties which are high in ascorbic acid.

There is no question that the ascorbic acid content of potato tubers can be greatly increased by breeding. Material is at hand which is significantly higher in ascorbic acid content than any known varieties. The task is to combine this high ascorbic acid content with desirable commercial characters. The search for a parent which will transmit a high ascorbic acid content to a high proportion of its progeny will be continued.

NEW YORK
J. R. Livermore

The 1954 growing season was quite favorable to the potato leafhopper. A rather prolonged dry spell, coupled with several days of high temperatures, accentuated the differences between the hopper-resistant and susceptible types. It would appear, too, that the two varieties, Houma and Katahdin, cannot stand dry weather without considerable loss in yield. Canoga performs much better with an ample supply of moisture, such as irrigation would provide.

The average production of 33 sixteen-hill rows of each of the 3 checks used in the potato trials, in pounds per a row, was Canoga 20, Houma 19, and Katahdin 17. Nearly 200 new seedlings averaged 27 pounds per row, and the best 50 strains averaged 34 pounds per row. In these plantings 1 pound a row is equivalent to 15 bushels an acre.

The principal objective of the potato-breeding project in the Department of Plant Breeding is to produce an early-maturing, high-quality, heavy-yielding strain of potato.

The attempt to produce satisfactory earlies was given a boost through the use of several early-maturing pollinators which Dr. Fred A. Krantz sent us a year ago. Many successful crosses were made, and the greenhouse-grown tubers will be planted in single hills in the field in 1955. There is always the possibility that an early may be found which is high yielding and has other desirable characters as well.

Many of the seedlings died relatively early because of foliage drying, due to heavy insect populations. The leafhopper was quite prevalent this year. It is our practice to use no insecticides after the Colorado potato beetle has been eliminated and usually the first spray accomplishes this. On the other hand, a goodly number of the new strains had a high percentage of green leaflets when the vines were killed on September 20.

Another year has gone by without finding any leafroll in the field, or when indexing in the greenhouse, on seedling B 24-58. When the first sample of this seedling was obtained from Dr. Donald Folsom of Orono, Maine, he wrote that hardly any progenies from the crosses using this sort produced acceptable tubers. However that may be, we now have many seedlings, from crosses using B 24-58, which have quite desirable tubers. We are continuing to try to incorporate B 24-58 germ plasm in as many crosses as possible.

Whatever other desirable characteristics a potato variety may have, the capacity to yield and to yield well even under adverse conditions, is highly essential. As costs of production continue to increase, total output per unit of land and labor becomes ever more important. The constant search for high-yielding strains continues.

The most important factor in the potato-breeding project, so far as this writer is concerned, is potato quality. The quality referred to is not the appearance of the tuber, the outside quality, but rather the culinary or cooking or eating quality. After all, as Dr. Ora Smith so aptly expressed it at the recent Potato Utilization Conference at Ithaca, the external appearance of the potato is tossed into the garbage can. The interior or eating quality is what brings the housewife back to the market for more potatoes.

The per capita consumption of potatoes has been decreasing for 50 years and took an alarming plunge the 10 years just past. Why? There are many reasons but the principal reason is poor eating quality. Many things are being done to persuade the consumer to buy more potatoes. Pre-peeled potatoes in tins, frozen french fries, potato chips, washed potatoes, and tubers in polyethylene bags are available now in the market. For those people who fancy a red-skin potato some processors are dyeing potatoes red. The per capita consumption of french-fried and potato chips has increased tremendously, but the overall total per capita consumption of potatoes continues downward. Something other than these external processes is needed to reverse the downward trend. I think that need is better eating quality.

This will be my last report as a collaborator in the National Potato-Breeding Program. On February 1, 1955, I am retiring from active duty at Cornell. I should like to take this opportunity to say "good-bye" to my friends who may still be concerned with the improvement of the Irish potato.

Good luck and good health to you all.

NEW YORK

M. W. Meadows and R. L. Sawyer

Potato variety trials were conducted in nine counties of New York State in cooperation with county agricultural agents and growers in the respective counties.

Seed of all sorts were obtained from the U.S.D.A. Station at Presque Isle, Maine, except Osage that was obtained from Minnesota.

All trials consisted of 4 replications of single 34-inch rows, 30 feet long.

Samples were taken from 3 replicates and specific gravity determinations made with a potato hydrometer. Average specific gravity was then transformed to percentage dry-matter content. Determinations for dry-matter content in Suffolk County are not available as yet. Yields and dry-matter content are given in Meadows tables 1 and 2.

The following varieties and seedlings were quite subject to such abnormalities as second growth and growth cracks: Irish Cobbler, Green Mountain, Russet Burbank, Early Gem, B 355-35, B 606-37, B 920-5, B920-7, B 2368-11 and Osage.

Of the new late-maturing varieties, Delus had less tendency to grow off-shape than Merrimack or Saco. In general, however, these varieties produced nice tubers where growing conditions were uniform.

Katahdin, B 73-10, and B 69-16 produced tubers of uniform shape. The eyes of B 69-16 tend to be deeper than Katahdin or B 73-10.

Meadows table 1. New York potato variety trials, 1954.

Variety and maturity	Yield per acre, U.S. No. 1 size, by County									Variety average
	Cort-land	Wyo.	Madi-son 1	Tomp-kins	Frank-lin	Steu-ben	Monroe	Gene-see	Suf-folk	
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
<u>1ST EARLY</u>										
I. Cobbler	519	403	609	321	309	422	246	426	544	422
B 920-5	-	369	688	-	-	-	194	-	414	416
Early Gem	559	359	-	307	220	387	-	311	623	395
B 920-7	425	303	518	262	178	315	242	204	509	328
<u>2ND EARLY</u>										
B 73-10	597	585	676	529	569	537	347	522	789	572
B 2368-11	589	486	555	458	518	571	399	524	754	539
Osage	516	311	672	-	202	414	-	-	-	423
<u>LATE</u>										
Gr.Mountain	771	754	637	654	575	623	591	583	774	662
B 69-16	-	599	587	-	-	-	637	-	795	655
Saco	748	607	454	488	569	609	680	535	997	632
B 355-35	691	706	625	549	537	547	597	573	681	612
B 606-37	734	585	579	529	492	591	601	537	745	599
Katahdin	705	597	563	474	448	494	520	522	628	550
Rus.Burbank	694	-	484	492	325	533	573	420	692	527
Merrimack	538	692	474	502	508	561	305	472	560	512
Delus	621	533	539	450	482	498	397	476	540	504
L.S.D. 19:1	156	108	N.S.	75	102	123	186	64	135	

1/ Muck soil

Meadows table 2. New York potato variety trials, 1954.

Variety and maturity	Dry-matter content by county								Variety average
	Cort-land	Wyo.	Madi-son 1/	Steuben	Tomp-kins	Frank-lin	Monroe	Genesee	
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
<u>1ST EARLY</u>									
I. Cobbler	20.4	20.9	16.9	21.7	22.2	20.2	17.9	18.4	19.8
920-5	-	18.9	15.6	-	-	-	15.6	-	16.7
Early Gem	18.2	18.9	-	18.7	20.2	18.2	-	17.4	18.6
B 920-7	20.7	20.7	17.7	20.9	21.2	19.9	17.2	18.7	18.9
<u>2ND EARLY</u>									
B 73-10	17.7	20.2	17.4	20.9	19.2	18.2	18.2	19.4	18.9
B 2368-11	16.2	17.3	15.4	17.9	17.4	16.9	16.0	17.2	18.4
Osage	19.0	21.2	16.5	21.9	-	20.7	-	-	19.9
<u>LATE</u>									
Gr.Mountain	18.7	20.9	18.7	23.5	21.8	20.7	19.4	19.2	20.4
B 69-16	-	21.4	17.7	-	-	-	19.0	-	19.4
Saco	20.9	22.1	18.2	24.3	22.1	21.9	19.4	21.2	21.3
B 355-35	19.7	21.2	17.7	23.3	20.7	20.4	17.9	19.0	20.0
B 606-37	20.5	21.9	18.7	23.0	21.2	20.4	19.7	20.7	20.8
Katahdin	19.0	20.7	16.9	22.0	19.7	18.9	18.9	19.0	19.4
Rus. Burbank	20.2	-	18.2	23.2	20.4	21.2	19.0	19.2	20.2
Merrimack	19.9	22.1	17.9	23.3	21.4	21.9	20.7	20.7	21.0
Delus	20.4	22.2	19.2	23.2	22.2	20.9	19.7	19.7	20.9

1/ Muck soil

NEW YORK

L. C. Peterson, A. P. Pieringer, and A. S. Alfieri

Within the limits of our experimental plots, rainfall occurred as widely scattered showers. On Long Island and in central New York, we suffered from an excess of water in the months of April and May, and from drought conditions during June, July, and August. This, together with some high temperatures, had its effect on yields which were very low in varieties of early and mid-season maturities. The situation on Long Island was further complicated by excessive wet periods in the fall of the year as result of the tropical hurricanes "Carol" and "Edna".

Blight and Scab

Races of Phytophthora infestans and their relationship to genes for resistance in Solanum demissum derivatives previously have been described. The object of the blight program has been to combine in one horticulturally acceptable variety as many of these genes as possible and to determine the possible additive effect of increasing the "dosages" of many of these genes. Late blight has been a minor factor in our breeding plots for the past few years. This has limited our observations to greenhouse inoculation trials.

Many of these seedlings possess scab-resistant parents and these are being tested in our scab nursery. This past season conditions were very favorable for the development of scab and many seedlings were eliminated.

Viruses

Varieties or seedlings possessing some resistance to the leafroll virus have been used as parental material. Seedlings were grown in rows alternating with plants infected with leafroll. Viruliferous aphids were introduced into the plot and the aphid population maintained at a high level throughout the season. Results of tuber-index trials with these seedlings show that a very small number survived the exposure and only a few of these survived the second exposure, without contracting the disease. Most of these which survived two years of exposure became infected when inoculated by means of caged, viruliferous aphids and all were infected when inoculated by means of grafts.

The hypersensitive reaction of potatoes to virus Y following mechanical inoculation was studied. It was found that seedlings could be produced which were hypersensitive to one strain but reacted systemically to others; hypersensitive to several strains but systemically infected with one strain; and hypersensitive to all strains used. The site of inoculation was important with the latter group of seedlings. If fully expanded leaves were inoculated, a hypersensitive reaction occurred, but systemic infection followed if inoculations were made on young, rapidly expanding leaves. The same results were obtained if inoculations were made using viruliferous aphids.

Black-Spot

Black-spot is a condition apparently induced by bruising. It consists of a blackening of the bruised tissue under the skin of the tuber which is objectionable when the tuber is peeled. Black-spot appears to be caused by some physiological condition which is aggravated by environmental conditions. A large number of varieties and seedlings have been tested and most of these were found to be susceptible. A few consistently have been free or nearly free of symptoms and have been used as parental materials. Many seedlings have been produced, tested, and discarded. A few, resistant to black-spot, and late blight as well, have performed well under Long Island and Up-State conditions. These currently are being grown in yield trials.

Golden Nematode

Many potato varieties and solanaceous plants have been tested by Dr. W. F. Mai for their resistance to the Golden Nematode (Heterodera rostochiensis). Only two, Solanum verunei (24 chromosomes) and S. sucrense (48 chromosomes) are resistant enough to be used in a breeding program. Recently, it has been reported from Europe that four collections of S. andigenum are resistant. Seed of these collections were obtained for our use by Dr. Hougas, of the Potato Introduction Station. Samples of these have been grown in soil, heavily infested with Golden Nematode. The results of this test are in accord with those reported from England, Scotland, and Holland. Individuals resistant to the Golden Nematode were identified and used for breeding purposes. A large number of crosses were obtained and seedlings are being prepared for testing.

NORTH CAROLINA
F. L. Haynes

An early variety to replace Irish Cobbler for the early commercial areas of North Carolina is the primary objective of this project. The seedling variety B 73-10 has performed well in this area for 4 years at 3 locations. B 73-10 has yielded better than Cobbler on the average, and has a much better appearance. It holds its skin much better in the handling and grading processes. This seedling makes high-quality chips.

The variety B 880-4 yielded high again in 1954 in the mountain area. According to tests, this variety has the same late blight resistance as Kennebec. It will be named and released in 1955. About 100 bags of breeders' seed were given to the N. C. Foundation Seed Growers Cooperative for increase.

An attempt to establish a scab nursery at our main station met with failure. A one-half acre site was selected on a light sandy loam soil. This tract was limed to adjust the pH to approximately 6.0. Four tons of manure and 1,000 pounds of very scabby potatoes were broadcast over the area in the fall of 1953. This spring the plot was planted uniformly to a susceptible variety. The net result was less scab in the plot than one normally finds in untreated land in the vicinity.

The accompanying N. C. tables give the results obtained from yield tests at two principal locations in each of our commercial production areas.

N. C. table 1. Yield test at Aurora, N. C., 1954. Plots 1/125 acre, 4 replications in randomized block design. Planted February 19, harvested June 15. Yields are U.S. No. 1 size A.

Variety	Yield per acre	Dry-matter	Maturity
	Bu.	Pct.	
LaSoda	394	16.9	Mid-season
NC 2625-18	387	18.6	Mid-season
B 2450-3	377	20.1	Late
NC 2391-47	374	18.9	Late
NC 2600-2	373	17.4	Mid-season
NC 880-3	347	15.2	Early
B 73-10	347	18.9	Early
NC 2403-53	317	18.6	Early
NC 2647-40	316	18.6	Mid-season
Sebago	307	17.9	Late
White Cloud	296	19.1	Early
Cobbler	284	18.6	Early
I973-6	279	18.6	Early
B 3008-24	270	20.4	Mid-season
NC 2157-4	233	19.9	Late
L.S.D. at 5%	45		
" " 1%	60		
C.V. for yield = 9.5%			

N. C. table 2. Yield test at Camden, N. C., 1954. Plots 1/125 acre, 4 replications in randomized block design. Planted February 23, harvested June 29. Yields are U.S. No. 1 - size A.

Variety	Yield per acre	Dry-matter	Maturity
	Bu.	Pct.	
NC 2609-36	648	16.9	Early
NC 2170-1	607	18.1	Late
Essex	588	17.6	"
LaSoda	564	16.9	Mid-season
B 2431-29	558	19.1	"
B 73-10	547	17.2	Early
B 2425-26	517	17.2	"
I976-6	498	18.1	"
NC 880-3	496	14.5	"
NC 2410-48	493	17.6	"
I. Cobbler	474	19.1	"
Sebago	452	18.1	Late
Bliss Triumph	444	17.6	Early
White Cloud	444	17.7	"
NC 2606-3	400	17.6	Late
NC 2157-4	316	20.2	"
L.S.D. at 5%	58		
" 1%	77		

C.V. for yield = 7.9%

N. C. table 3. Yield test at Hendersonville, N. C., 1954. Plots 1/250 acre, 4 replications in randomized block design. Planted April 16, harvested August 17. Yields are U. S. No. 1, size A.

Variety	Yield per acre	Dry-matter	Maturity
	Bu.	Pct.	
Sequoia	355	15.9	Late
B 880-4	326	15.4	"
I916-52	305	15.2	"
NC 2414-17	303	15.4	"
B 91-14	302	16.2	"
NC 2170-3	301	14.0	"
NC 2416-43	298	15.0	"
NC 880-8	289	14.7	"
B 91-3	286	15.4	"
NC 2417-76	266	13.0	"
NC 2157-5	259	17.2	"
Essex	251	13.7	"
NC 2670-11	249	15.6	"
NC 880-7	236	14.0	"
Kennebec	234	15.8	"

N. C. table 3 continued

Variety	Yield per acre	Dry-matter	Maturity
	Bu.	Pct.	
TL 2763	226	15.0	Late
Katahdin	215	15.0	Late
B 73-10	214	16.9	Mid-season
Sebago	199	14.5	Late
Green Mountain	182	18.4	"
Bliss Triumph	180	14.7	Early
NC 911-6	173	14.0	Mid-season
L.S.D. at 5%	50		
" 1%	67		

C.V. for yield = 13.8%.

N.C. table 4. Yield test at Jefferson, N. C., 1954. Plots 1/250 acre, 4 replications in randomized block design. Planted May 11, harvested September 24. Yields are U.S. No. 1 - size A.

Variety	Yield per acre	Dry-matter	Maturity
	Bu.	Pct.	
NC 2416-43	329	17.9	Late
Sequoia	316	18.9	"
B 880-4	308	17.2	"
B 91-14	296	18.4	"
NC 880-7	279	16.2	"
NC 2170-3	278	17.6	"
NC 2670-11	275	18.2	"
Kennebec	267	17.9	"
Essex	263	14.7	"
NC 2417-76	250	15.2	"
NC 2414-17	238	18.2	"
NC 911-6	206	16.0	Mid-season
B 91-3	205	18.9	Late
NC 2414-49	199	19.9	"
Sebago	197	16.2	"
I916-52	174	20.4	"
Green Mountain	173	19.0	"
B 73-10	164	20.5	Mid-season
Bliss Triumph	147	19.2	Early
NC 880-8	305	17.5	Late
L.S.D. at 5%	53		
" 1%	70		

C. V. for yield = 15.4%

NORTH DAKOTA
W. P. Baird

Thirty-two varieties of potatoes were tested at the Northern Great Plains Field Station, Mandan, North Dakota, in 1954, each variety being replicated five times in randomized blocks. The results of the test are shown in Mandan table 1, where varieties are arranged in order from the highest yielding to the lowest yielding. Potatoes were planted on May 21 and dug on October 4. Yields were somewhat below average and considerable scab was present. The first killing frost occurred on September 20, 1954.

Mandan table 1. Potato variety trials at the Northern Great Plains Field Station, Mandan, North Dakota, 1954.

Variety	Average yield U.S. No. 1 per acre	No. 1 compared with total	Solids
	Bu.	Pct.	Pct.
White Rose	199	85	20.41
Kennebec	196	91	19.92
Russet Rural	188	88	21.93
Rural New Yorker	172	85	21.41
Irish Cobbler	172	90	21.67
Norkota	167	86	21.41
Sequoia	159	86	19.42
Teton	158	80	20.41
Sebago	157	86	18.91
Mohawk	154	88	21.98
N. D. 457-1	152	84	21.93
Erie	150	82	20.67
Houma	150	78	22.20
Early Gem	145	94	19.40
Katahdin	140	88	19.66
Red Pontiac	140	84	20.15
Chippewa	137	78	19.27
Pawnee	130	75	17.70
Mesaba	129	81	20.41
Warba	125	78	20.41
Pontiac	124	84	19.17
Osage	123	87	20.41
Triumph	113	72	18.42
Redkote	111	79	20.41
46952	102	82	18.42
Waseca	99	88	15.98
Red Warba	96	82	20.15
Kasota	95	80	16.94
Earlaine	92	66	19.17
Earlaine 2	87	77	17.70
Cherokee	88	70	17.70
Progress	62	58	17.20
L.S.D. 5% level	28		
" 1% "	37		

Spacing rows $3\frac{1}{2}$ '; hills 18". Plots 37' long; 25 hills to plot.

NORTH DAKOTA
W. G. Hoyman

Included in the 1954 Fargo scab nursery were 25 entries from the National Uniform Scab Nursery Trial, 16 selections and 5 varieties. Triumph was used for the susceptible check variety and Early Gem, Russet Burbank, Ontario, and Osage as varieties showing a high degree of resistance. The plot was planted May 11 and harvested October 4. Over one-half of the plot was devoted to new selections from the Department of Horticulture. Readings on these are not included in this report.

Among the entries from the National Trial, B 2162-49 and B 2162-36 showed the highest degree of scab resistance. Other Federal selections with type 1 lesions were B 2876-1 and B 3131N1. Early Gem, Russet Burbank, and Ontario maintained their high degree of resistance.

ND457-1-35, ND457-1-36, and I803-3 are white selections increased in North Dakota during 1954. The results in N. Dak. table 1 indicate they have some resistance.

One hundred six advanced selections from the Department of Horticulture were planted in scab-infested soil at Northwood, N. Dak., in order to determine their resistance. The readings from this trial are shown in N. Dak. table 2. Four selections had type 1 lesions and several type 2. Such readings indicate many of the selections have resistance to the scab organism present in the Northwood vicinity.

N. Dak. table 1. Scab readings from the Fargo, N. Dak., scab nursery of 25 entries included in the National Uniform Scab Nursery Trial, 16 other selections, and 5 varieties.

Selection and variety	Total tubers	Tubers showing types of scab infection					Most severe infection
		0	1	2	3	4	
	No.	No.	No.	No.	No.	No.	
B 2162-49	100	99	1				1-1
Early Gem	72	71	1				1-1
Russet Burbank	80	78	2				1-1
Ontario	122	119	3				1-1
B 2876-1	83	80	3				1-1
B 3131N1	43	36	7				1-1
B 2162-36	81	62	19				2-1
B 2368-11	114	79	34	1			1-2
B 3131N2	45	36	8	1			1-2
Osage	84	78	4	2			1-2
B 3131N3	51	45	4	2			1-2
B 3255N1	59	45	11	3			1-2
B 2920	121	102	14	5			1-2
I947-W18	85	61	17	7			1-2
B 2274-4	169	152	7	10			1-2

N. Dak. table 1 continued.

Selection and variety	Total tubers	Tubers showing types of scab infection					Most severe infection
		0	1	2	3	4	
	No.	No.	No.	No.	No.	No.	
B 962-3	45	39	1	5			5-2
ND457-1-35	100	92	1	6	1		1-3
B 73-10	45	30	7	7	1		1-3
B 3310-5	32	25	4	2	1		1-3
B 3003-36	76	48	26		2		1-3
ND 457-1-36	146	115	20	8	3		1-3
B 2368-4	85	65	10	7	3		1-3
I803-3	76	62	4	5	5		1-3
B 3114-52	104	72	9	17	6		1-3
B 3003-27	121	49	39	26	7		1-3
B 3006-22	143	111	16	8	8		1-3
B 2368-13	113	61	24	20	8		1-3
B 3004-9	81	54	7	12	8		1-3
B 3140-36	95	19	41	27	8		1-3
CS9947	92	59	12	11	10		1-3
B 2968-56	109	40	19	28	22		2-3
I801-10	70	23	21	17	9		3-3
B 2922-15	114	37	17	28	32		3-3
B 2879-4	63	13	18	27	5		4-3
B 2922-26	78	20	13	26	19		4-3
B 3107-17	123	85	8	8	21	1	1-4
ND457-1-39	92	55	8	13	15	1	1-4
B 3334-6	36	28	1	2	4	1	1-4
B 73-18	39	26		4	8	1	1-4
B 595-76	104	96	2	2	2	2	1-4
ND457-1-30	78	52	16	4	3	3	1-4
B 3309-2	63	39	16		1	4	1-4
B 3014-6	90	34	34	10	7	5	1-4
B 2887-2	46	26	4	4	7	5	1-4
B 3097-16	53	46		2	3	2	2-4
Triumph							3-4

N. Dak. table 2. Scab readings of the Department of Horticulture selections grown at Northwood, N. Dak.

Selection	Scab readings	Selection	Scab readings	Selection	Scab readings
M5101-4	1-1	3028-6	1-3	3203-5	1-2
457-1-48	1-3	3033-6	3-2	3203-6R	2-3
2929-8R	3-3	3045-7R	2-2	3203-7	2-2
2929-16R	rogued	3046-1R	1-4	3207-4	2-4
2930-1R	1-3c	3047-1	1-3	3208-2r	1-4
2962-3	rogued	3055-3	rogued	3218-2R	1-3c
2962-4	"	3059-6	2-2	3220-2R	rogued
2972-2R	1-3	3060-1	rogued	3221-3	"
2976-2R	1-3	3070-5r	2-2	3221-5	"
2976-4R	5-2	3080-2	1-2	3223-2R	"
2987-2	3-2	3086-1	1-3	3224-1	1-1
2994-2R	5-2	3089-1	2-2+	3231-4	2-2
2994-4R	5-2	3095-3R	2-3	3241-2R	1-3
2994-13R	1-3	3127-1	1-2	3247-2R	2-2
2994-27r	1-3	3144-1 ^b	1-3	3254-2	1-1
3021-1r	1-3	3152-1 ^b	1-3	3255-1	1-3
3022-7	1-4	3168-1R	3-2+	3259-5	2-3c
3022-8	1-5	3168-2R	1-3	3261-4	1-1
3022-18	1-5	3183-1r	2-2	3268-1	1-3
3022-27	2-4	3185-1R	2-2	3268-3	1-3
3022-29	1-4	3185-2R	rogued	3268-4	1-3
3022-69	1-4	3189-1b	3-2	3271-1	2-3c
3026-4	2-4	3203-1	2-2	3282-9	3-2+
3291-1	1-3c	3296-7	1-4	2555-6R	5-2
3291-5	3-2	3297-8	1-3c	2555-12R	5-2
3292-2	5-2c	457-1	1-3c	2728-2OR	1-3
3293-2	5-2c	457-1-4	rogued	2774-3R	2-2
3293-6	5-2c	457-1-10	1-4	2799-5R	3-2+
3293-9	5-2c	457-1-16	1-4	2851-4	2-3c
3294-13	1-3	457-1-35	1-3	2855-2	5-3c
3295-4	3-3	457-1-36	2-2c	2906-1R	5-2
3295-6	1-3	2124-2R	1-3	2910-1R	3-2
3295-7	2-2	2124-2OR	2-2	1906-1	2-3c
3296-1	1-3	2200-1R	3-2	1909-2	2-2c
3296-3	2-3c	2231-2	1-3	1910-3	1-4
3296-6	2-2c	2475-8	rogued		

Testing Potato Selections and Varieties for their Reaction to Virus Y

The 1953 virus Y test showed ND457-1-23 was quite susceptible to infection, so it was not included in the 1954 trials. The 20 surviving inbreds shown in N. Dak. table 3 were planted in 1954 for further testing. The seed of each inbred was taken from plants exposed to infection in 1953. Whole tubers were planted and the number of plants showing primary infection are shown in the table.

N. Dak. table 3. Number of ND457-1 inbreds showing primary symptoms of virus Y.

Inbred	Plants No.	Virus Y symptoms	
		6/28	7/16
457-1 4	25		
457-1-6	27		
457-1-10	19	5	5
457-1-16	12		
457-1-22	13		
457-1-24	8		
457-1-26	19		
457-1-27	3		
457-1-28	21		
457-1-30	30		
457-1-31	9		
457-1-32	10		
457-1-33	8		
457-1-34	13		
457-1-35	19		
457-1-36	18		
457-1-37	16	3	
457-1-39	18		
457-1-41	15		
457-1-42	12		

The readings in N. Dak. table 3 are not complete because 8 of the inbreds had been rogued by July 3 for leaf roll. Some leaf roll appeared in each inbred and roguing was so extensive that the results of this experiment may not be of much value.

Recent research by^a Canadian worker indicates virus Y transmission by Myzus persicae is more efficient if the starved aphids are allowed to feed on virus-Y-carrying plants about 2 minutes before being transferred to healthy plants. This method was used to infect the inbreds and Triumph checks shown in N. Dak. table 4. The inbreds used were those remaining in the plot described in N. Dak. table 3.

N. Dak. table 4. ND457-1 inbreds infested with starved aphids that had fed on ND530 for approximately 2 minutes.

Inbred	Plants	Date infested	Aphids
	No.		No.
457-1-16	2	7/3	5-10
457-1-27	2	"	"
457-1-28	2	"	"
457-1-30	2	"	"
457-1-32	1	"	"
457-1-33	2	"	"
457-1-34	2	"	"
457-1-35	2	"	"
457-1-36	2	"	"
457-1-39	2	"	"
Triumph	2	"	"

Weekly observations were made after July 3 in order to watch for current-season infection of the inbreds and Triumph checks in N. Dak. table 4. One of the inbreds showed symptoms but the killing frost on September 21 made it impossible to make an accurate reading. The failure of the 2 check plants to show current-season symptoms casts some doubt as to the efficiency of this method of inoculation. The tubers from all the plants in N. Dak. table 4 were harvested and will be planted in 1955.

Seedlings surviving a greenhouse virus Y test were planted in the 1954 virus Y plot and infested with aphids by the method described above.

N. Dak. table 5. Greenhouse seedlings that were tested in the field during 1954 and survived the virus Y test.

Seedling	Plants	Date infested	Aphids	Remarks
	No.		No.	
3404-1	1	7/3	10-15	
3415-11	1	"	"	
3415-22	1	"	"	
3415-18	1	"	"	Rogued
3423-1	1	"	"	Rogued
3455-1	1	"	"	Rogued
3415-17	1	7/29	5	
3415-18	1	"	"	
3423-2	1	"	"	
3423-4	1	"	"	
3550-1	1	"	"	

Three of the seedlings were removed because of questionable leaf roll. The others were observed weekly and one showed current-season symptoms. No field notes were recorded before the killing frost. All the hills were harvested and will be planted in 1955.

Further research was continued in an attempt to find a good local lesion indicator plant for virus Y. The collection of weed seeds shown in N. Dak. table 6 was obtained from the Iowa State College Seed Testing Laboratory. As expected, several had leaves that were not satisfactory for inoculation. Several did not grow satisfactorily in the greenhouse during March and April. No satisfactory local lesion indicator was obtained from this large collection.

N. Dak. table 6. Weeds screened for a virus Y local lesion indicator.

Latin name	Common name	Latin name	Common name
<i>Abutilon Theophrasti</i>	Indian mallow	<i>Digitaria sanguinalis</i>	Crab grass
<i>Acnida tuberculata</i>	Water hemp	<i>Digitaria</i> sp.	
<i>Agastache nepetoides</i>	Giant hyssop	<i>Euphorbia esula</i>	Leafy spurge
<i>Ambrosia trifida</i>	Great ragweed	<i>Hibiscus Trionum</i>	Shoo-fly
<i>Amaranthus albus</i>		<i>Kochia Scoparia</i>	Mexican fireweed
<i>Amaranthus retroflexus</i>	Pigweed	<i>Lactuca Scariola</i>	Prickly lettuce
<i>Anthemis Cotula</i>	Dog fennel	<i>Lappula echinata</i>	Stickweed
<i>Brassica nigra</i>	Black mustard	<i>Lepidium</i> sp.	Pepergrass
<i>Brassica</i> sp.	Mustard	<i>Lychnis alba</i>	White campion
<i>Cannabis sativa</i>	Hemp	<i>Malva</i> sp.	Mallow
<i>Capsella Bursa-pastoris</i>	Sheperd's purse	<i>Nepeta Cataria</i>	Catnip
<i>Cirsium altissimum</i>	Common thistle	<i>Oenothera biennis</i>	Evening primrose
<i>Cirsium arvense</i>	Canada thistle	<i>Pastinaca sativa</i>	Wild parsnip
<i>Cirsium vulgare</i>		<i>Plantago lanceolata</i>	Rib grass
<i>Chenopodium album</i>	Lamb's quarter	<i>Plantago Rugelii</i>	
<i>Convolvulus septium</i>	Morning glory	<i>Polygonum convolvulus</i>	Wild buckwheat
<i>Datura stramonium</i>	Jimson weed	<i>Polygonum pennsylvanicum</i>	Pa. smartweed
<i>Polygonum Persicaria</i>	Lady's thumb	<i>Sisymbrium officinale</i>	Hedge mustard
<i>Polygonum punctatum</i>	Water smartweed	<i>Sisymbrium Sophis</i>	Sophia
<i>Portulaca oleracea</i>	Purslane	<i>Solanum carolinense</i>	Horse nettle
<i>Potentilla norvegica</i>	Five-finger	<i>Sonchus oleraceus</i>	Sow thistle
<i>Prunella vulgaris</i>	Self-heal	<i>Teucrium occidentale</i>	Germander
<i>Rumex altissimus</i>	Smooth dock	<i>Thlaspi arvense</i>	Penney cress
<i>Rumex crispus</i>	Curled dock	<i>Tragopogon</i> spp.	Coat's beard
<i>Salvia</i> sp.		<i>Verbascum thapsus</i>	Mullein
<i>Saponaria officinalis</i>	Bouncing bet	<i>Verbena hastata</i>	Blue verbena
<i>Silene dichotoma</i>	Night flowering	catchfly <i>Verbena Stricta</i>	Hoary verbena
<i>Silene noctiflora</i>	Night flowering	catchfly <i>Verbena urticaefolia</i>	White "
<i>Sisymbrium altissimum</i>	Tumbling mustard		

Testing Potatoes for Resistance to the Fungus, Phytophthora infestans,
Causing Late Blight

During the winter and spring of 1954 late-blight experiments were conducted with parental stock and advanced selections. During July and August several flats of seedlings were screened for resistance. U.S.D.A. parents having resistance to race 0 were I803-3, I947-W18, I1049-3, B 2876-1, B 3131N1, B 3131N2, B 3131N3, and B 3131-8.

Thirty-nine second- and third-year selections from the Department of Horticulture were tested for resistance to race 0. The test was conducted during March with plants growing in pots. Eight days after the plants were sprayed with zoospores, the symptoms were scored as follows: 1 = the most susceptible having yellow leaves and abundant mycelial growth; 2 = some yellowing of the leaves and less mycelial growth; 3 = plants green with small necrotic lesions; and 4 = plants green with no necrotic spots visible to the eye.

N. Dak. table 7. Second- hand third-year selections from the Department of Horticulture screened for resistance to race 0.

Pedigree	Parentage	Score	Pedigree	Parentage	Score
<u>Second-year selections</u>					
2786-1	626X Cherokee	4	3524-3	B 2336N1 x 2098-1	1
3305-1	Canso x NDI9100-3	1	3525-1	B 2336N1 x B 355-44	1
3307-2	Canso x B 991-13	4	3525-2	B 2336N1 x B 355-44	1
3315-1	Cherokee x NDI9100-3	1	3525-3	B 2336N1 x B 355-44	1
3315-2	Cherokee x NDI9100-3	1	3525-4	B 2336N1 x B 355-44	1
3440-2	2226-2 x B 991-13	4	3527-1	B 2336N1 x B 991-13	4
3453-2	2387-1 x Canso	1	3575-1	I18168-28 x B 991-13	3
3474-1R	2572-7R x Canso	1	3655-1	W304 x B 991-13	4
3489-2	B 355-44 x 2242-4	1	GQT-1-1	Self	4
3503-1	B 991-13 x 457-1-4	4	GQT-1-2	Self	4
3503-5	B 991-13 x 457-1-4	4	GQT-1-3	Self	4
3505-1	B 991-13 x 2098-1	4	2TG-15-1	Self	1
3511-1	B 991-13 x NI9100-3	4	2TG-15-3	Self	3
3511-3	B 991-13 x NI9100-3	4	2TG-15-3	Self	4
3515-1	B 991-13 x I8168-28	2	M52-15-1	Teton x Cherokee	1
3515-4	B 991-13 x I8168-28	2	B 922-6	TI5 x B 355-24(check)	4
<u>Third-year selections</u>					
3080-2	Cherokee x B 991-12	4	3293-6	2TG-15 x B 2067-10r	3
3208-2	B 738-8 x B 2067-10r	2	3293-9	2TG-15 x B 2067-10r	4
3218-2R	B 738-8 x B 2067-10r	4	3295-7	2TG-15 x M15-2-10-9	4
3254-2	B 2337-7R x B 874-24r	1			

During August several flats of seedlings were screened for resistance to race O. Seedlings furnished by the Department of Horticulture are given in N. Dak. table 8 and those screened from the Federal program are shown in N. Dak. table 9.

N. Dak. table 8. Department of Horticulture seedlings screened for resistance to late blight race O.

Pedigree	Parentage	Pedigree	Parentage
3924	Redkote x B 2876-1	4006	3202-1 x B 3131-8
3926	Redkote x B 3131-8	4007	3203-7 x B 3131-8
3932	457-1 x B 3131-8	4011	3247-2R x B 3131-8
3934	457-1 x B 2876-1	4012	3247-2R x B 2876-1
3937	457-1-4 x B 2876-1	4016	3255-1 x B 3131-8
3940	457-1-10 x B 3131-8	4021	3144-1 x B 2876-1
3941	457-1-10 x B 2876-1	4023	3185-1 x B 3131-8
3944	457-1-16 x B 2876-1	4026	3291-5 x B 2876-1
3946	888-8-1R x B 2876-1	4029	3291-5 x B 3131-8
3951	2124-16R x B 3131-8	4033	3295-6 x B 3131-8
3955	2387-1 x B 3131-8	4041	3297-2 x B 2876-1
3959	2475-8 x B 2876-1	4042	3297-2 x B 3131-8
3961	2555-6R x B 2876-1	4043	3297-2 x B 3131N3
3962	2569-4R x B 2876-1	4044	3297-2 x I801-10
3965	2569-4R x B 3131-8	4071	B 2876-1 x 457-1
3967	2780-6R x B 2876-1	4073	B 2876-1 x 2976-2
3968	2780-6R x B 3131-8	4074	B 2876-1 x 3185-1R
3970	2780-8R x B 2876-1	4093	B 3131-8 x 457-1
3973	2786-1 x B 2876-1	4094	B 3131-8 x 457-1-10
3977	2910-1R x B 3131-8	4095	B 3131-8 x 3183-1R
3981	2976-2R x B 2876-1	4096	B 3131-8 x 3185-1R
3982	2976-2R x B 3131-8	4097	B 3131-8 x 2910-1R
3999	3047-1 x B 3131-8	4116	CS9947 x B 3131-8
4004	3070-5R x B 3131-8	4134	M24 x B 2876-1
3923	Manota x B 595-76	4047	3297-2 x 2475-8
3958	2475-8 x B 595-76	4048	B 595-76 x 457-1
4003	3047-1 x B 595-76	4049	B 595-76 x 476M2
4008	3203-7 x 457-1-10	4050	B 595-76 x 2475-8
4027	3291-5 x M24	4051	B 595-76 x 457-1-10
4028	3291-5 x B 3159-1	4052	B 922-3 x 457-1-10
4031	3291-5 x 457-1	4053	B 922-3 x 457-1
4032	3292-5 x B 2162-36	4054	B 922-3 x 2475-8
4034	3295-6 x W1301	4055	B 922-3 x 157-1-10
4035	3295-6 x 457-1	4056	B 922-3 x 2853-3R
4038	3296-3 x 457-1	4057	B 922-6 x 3185-1R
4039	3296-3 x 457-1-10	4058	B 922-6 x 457-1-10
4040	3297-2 x B 922-3	4059	B 922-6 x 2910-1R
4045	3297-2 x 457-1	4060	B 922-12 x 457-1-10

N. Dak. table 9. Federal seedlings screened for resistance to late blight race 0.

Pedigree	Parentage	Pedigree	Parentage
F26	Early Gem x B 2876-1	F38	I947-W18 x B 3131-8
F27	B 2876-1 x Early Gem	F39	I947-W18 x B 2876-1
F28	I803-3 x Early Gem	F40	B 3131N1 x B 2876-1
F29	Early Gem x I803-3	F41	B 2368-4 x I803-3
F30	Kennebec x Early Gem	F42	B 3131N2 x B 2876-1
F31	Early Gem x Kennebec	F43	Redkote x B 2876-1
F32	B 3131N2 x Early Gem	F44	B 2368-4 x B 2876-1
F33	B 3131-8 x Early Gem	F45	B 3131N1 x I803-3
F34	I803-3 x B 3131-8	F46	B 3131N3 x B 2876-1
F35	B 3131-8 x I803-3	F47	I1049-3 x B 3131-8
F36	B 2876-1 x I803-3	F48	I1049-3 x B 2876-1
F37	I803-3 x B 2876-1		

Adaptation Test of United States Department of Agriculture Stock

The 1954 U.S.D.A. plot was located on the Aldrich Farm at Northwood where scab is severe. Because this disease is severe at this location, a large percentage of the stock is always eliminated the first year it is grown. Included in the 1954 plot were seedlings from Beltsville, Md., Ames, Iowa, and Fargo, N. Dak.

N. Dak. table 10. Seedling tubers furnished by F. J. Stevenson, U.S.D.A.

Pedigree	Parentage	Main characteristics	Tubers
			No.
B 3580	B 2935-7 x B 3014-10	Res. to scab and late blight	170
B 3581	B 2968-31 x B 3014-10	do	159
B 3582	B 2997-9 x B 2968-31	do	145
B 3583	Gr. Mt. x "	do	208
B 3585	B 2968-31 x Cherokee	do	27
B 3597	B 991-14 x Saranac	Res. to scab, late blight, & ring rot	185
B 3598	" x Teton	do	180
B 3599	B 2935-7 x B 3021-3	do	217
B 3600	B 3021-3 x Katahdin	Res. to virus A, ring rot, & net nec.	148
B 3602	" x B 2968-31	Res. to scab, late blight & ring rot	35
B 3603	Saranac x B 929-32	do	285
B 3604	" x B 2395-14	Res. to virus X, late blight & ring rot	110
B 3605	Teton x B 929-32	Res. to scab, late blight & ring rot	290
B 3609	B 922-3 x B 355-24	Res. to late blight and ring rot	36
B 3610	B 931-2 x (X96-56)	Res. to virus X, late blight & ring rot	167
B 3617	B 1268-1 x (X792-94)	Res. to viruses A & X & vert. wilt	58

N. Dak. table 10 continued.

Pedigree	Parentage	Main characteristics	Tubers No.
B 3618	B 1268-26 x (X792-94)	Res. to viruses A & X and vert. wilt	134
B 3626	B 595-76 x B 2067-52	" " A, X, & Y, scab, late blight, and vert. wilt	130
B 3627	B 606-37 x B 2067-52	Res. to viruses A, X, & Y, scab, and late blight	137
B 3637	Ac. 25941-1 x B 1172-14	Res. to virus Y	77
B 3645	B 595-76 x B 929-32	Res. to viruses A & X, scab, late blight, and vert. wilt	95
B 3646	B 595-76 x B 2395-14	do	90
B 3651	B 606-67 x Cherokee	Res. to viruses A & X, scab and late blight	65
B 3652	(X792-88 x " "	Res. to viruses A & X, scab, late blight and vert. wilt	56
B 3653	(X792-88) x B 2395-14	Res. to viruses A & X, late blight and vert. wilt	115
B 3654	B 779-1 x Katahdin	Res. to viruses A & X, late blight and net necrosis	42
B 3655	B 2331-5 x B 929-32	Res. to scab and late blight	25
B 3656	B 2337-7 x B 2331-5	do	31
B 3657	B 2337-7 x B 2968-31	do	50
B 3658	B 2337-7 x B 2998-1	do	39
B 3659	B 2368-4 x B 2337-7	do	59
B 3661	B 2887-2 x B 2998-1	do	85
B 3662	B 2998-1 x B 2331-5	Res. to scab	40
B 3663	B 2998-1 x B 2368-4	do	31
B 3664	B 2998-1 x B 2395-14	Res. to virus X and scab	177
B 3665	LaSoda x B 2368-4	Res. to scab	38
B 3666	Pontiac x B 2368-4	Res. to scab	16
B 3667	Progress x " "	Res. to scab	26
B 3668	Triumph x " "	Res. to scab	41
B 3669	B 381-2 x " "	Res. to scab	26
B 3671	B 874-35 x B 2997-9	Res. to scab and late blight	16
B 1435	B 2068-23	Res. to virus Y	96

From the Stevenson stock 89 hills were selected shown in N. Dak. table 10. In selecting these hills special attention was given to scab resistance. Progenies from parents having immunity to virus X and resistance to late blight and other diseases were considered when the selections were made.

N. Dak. table 11. Single hills selected from the Stevenson stock.

Pedigree	Hills			Pedigree	Hills		
	White	Red	Russet		White	Red	Russet
	No.	No.	No.		No.	No.	No.
B 3581	4			B 3627	6		1
B 3583	5			B 3637	4		
B 3585	1			B 3645	6		
B 3597	1			B 3646	1		
B 3598	3			B 3651	8		
B 3599	1			B 3652	2		
B 3600	1			B 3653	2		
B 3603	12			B 3654	1		
B 3605	15			B 3655	1		
B 3617	1			B 3657	1		
B 3618	2			B 3659			1
B 3626	8			B 3668	1		

Seedling tubers received from Iowa are shown in N. Dak. table 12. All of the progenies were segregating for scab and late blight resistance, and some were from parents having immunity to virus X. Much of this material was late in maturity, and the tubers were small. One red hill from progeny No. 11215 was saved for increase.

N. Dak. table 12. Seedling tubers from Iowa.

Pedigree	Parentage	Segregating for:	Number
Ia. 1188	B 2875-8 x B 2903-17	S, LB, LR, X, Red	329
" 1210	" x Osage	S, LB, X, Red	181
" 1212	Min. 43.46-6 x Ia. 947-10	S, LB, Red	370
" 1213	Ia. 976-3 x "	"	179
" 1214	B 874-24 x "	"	347
" 1215	B 2874-4 x "	"	435
" 1216	B 2875-8 x "	S, LB, X, Red	584
" 1217	B 2924-10 x "	S, LB, Red	129
" 1218	B 2993-4	"	735
" 1219	Ia. 947-10 self	"	126
" 1222	Ia. 947-10 x B 962-32	"	729
" 1229	Ia. 947-13 x B 874-25	"	56
" 1230	Ia. 957-1 x "	"	29
" 1327	B 2875-8 x Ia. 1077-16	S, LB, (A, BC, BD) x Red	536

N. Dak. table 13. Seedling tubers supplied by Wm. G. Hoyman.

Pedigree	Parentage	Segregating for:
F1	B 3132N1 x B 1290-2	Scab, russet, early
F2	B 1290-2 x Early Gem	Scab, russet, early
F3	Early Gem x B 3132N1	Scab, russet, early
F4	B 3131N1 x B 2162-36	Scab, red
F5	I972-2 x B 2331-5	Scab, red
F6	B 2872-1 x B 2067-1	Scab, red
F7-	B 2872-1 x B 3131N1	Scab, red
F8	Early Gem x B 1290-2	Scab, russet, early
F9	B 2331-5 x B 2067-1	Scab, red
F10	B 2162-36 x B 2872-1	Scab, red
F11	B 3131N1 x B 2331-5	Scab, red
F12	B 3132N1 x Early Gem	Scab, russet, early
F13	B 2162-36 x B 2331-5	Scab, red
F14	B 2331-5 x B 874-24	Scab, red
F15	B 1290-2 x B 3132N1	Scab, russet, early
F16	B 2331-5 x B 3131N1	Scab, red
F17	B 3306N1 x B 2162-36	Scab, red
F18	B 874-24 x B 3306N1	Scab, red, early
F19	B 874-24 x Redkote	Scab, red, early
F20	B 2102-11 x B 3131N1	Scab, red,
F21	B 874-24 x B 3131N1	Scab, red, early
F22	B 874-24 x B 2162-36	Scab, red, early
F23	41956 x B 3131N1	Scab, red, virus X

The following 10 single hills were selected from the stock in N. Dak. table 13: F1, 3 russet; F3, 1 russet; F7, 2 red; F11, 1 red; F18, 1 white and F19, 1 red and 1 russet.

The Texas Plot

There is need in the Rio Grande Valley, Tex., for red-skin varieties resistant to scab, or late blight, or both to replace Triumph and Pontiac. In an attempt to get all the worthwhile red-skin varieties tested in the Valley, F. J. Stevenson wrote to all the potato breeders in the United States who are attempting to produce superior red-skin varieties, asking them to send seed stock of their best selections to be increased in North Dakota as a source of seed for planting at Weslaco, Tex. It is thought that if all seed is produced at one location the results of the tests in Texas will be more reliable. The parties submitting stock and the selections submitted are shown in N. Dak. table 14. The 98 selections were planted on the Thompson Farm, approximately 4 miles northwest of Northwood.

N. Dak. table 14. Selections to be planted at Weslaco, Tex., and Homestead, Fla.

Designation	Color	Scab	Race O, L. blight	Maturity	Designation
Submitted by T. Dykstra, Louisiana					
1354	Pale ^{1/}		^{2/}	M	Replicate
1393	"	T-3	+	E	"
1396	"		+	L	"
1404	"		^{2/}	L	Drop
1699	"	2-2	-	M	Observation
1859	"	T-2	-	M	Replicate
2109	White		+	L	Drop
2336	Pale		+	L	"
2396	White		-	M	Observation
2867	Pale		+	L	Drop
2988					Rogued
3266					"
3546	Red	T-1	+	L	Replicate
3655	"	1-2	-	M	"
3769	White	1-1	+	L	Observation
3953	"	1-2	-	M	Replicate
3972	Pale	1-2	+	L	Observation
3976	"	1-3	+	M	Replicate
4001					Rogued
4101	White	1-3	-	M	Observation
4145	Red	1-2	+	M	Replicate
4160					Rogued
4166	Red		+	L	Replicate
4379	Pale	2-2	-	E	"
4399	"	1-1	+	M	Observation
4411	"	1-1	-	L	"
4422	"	T-1	+	M	Replicate
4458	"	T-2	+	E	Observation
4729	"	1-2	-	E	"
4735	White	2-2	+	E	Replicate
4753	Pale		-	E	Observation
4774					Rogued
4808	Pale	1-1	+	M	Observation
4811	"	1-1	+	L	"
4814	"	3-2	-	L	Replicate
4817	"		-	L	"
4864	"		-	L	Drop
4893	Red	1-2	+	L	Replicate
4908	"	T-2	+	L	"
2340-2	"	1-2	-	L	Observation
2368-4	Pale	1-2	+	L	Replicate
2874-4	"	1-3	-	L	"
2874-6					Rogued
3309-6	"	1-2	-	L	Replicate
3309-8	Red	1-2	-	M	"

N.. Dak.. table 14 continued

Designation	Color	Scab	Race O L. blight	Maturity	Designation
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Submitted by John G. McLean, Idaho

B 2876-2	Pale	1-2	+	E	Observation
B 2878-5	"	1-2	-	L	"
A111-4	"		+	L	Drop
A114-3	"	T-2	+	L	Observation
A114-4	"		+	L	"
A114-17					Rogued
A153-12	"	T-1	+	L	Observation
A153-15	"	1-1	+	L	"
B 2368-4					Rogued

Submitted by W. C. Edmundson, Colorado

7724	Pale		+	L	Replicate
12621	Red		+	L	Observation
12623	"	1-3	+	L	Replicate

Submitted by H. O. Werner, Nebraska

20.42-1	Red	3-3	+	L	Observation
20.44-2	"	1-2	+	E	Replicate
25.42-2	Pale	4-4	+	M	Observation
26.44-2	Red	3-4	+	L	Replicate
38.42-3	"	2-4	+	L	Observation
73.37-4	"	1-4	+	L	Replicate
91.47-7	Pale	2-2	+	L	Observation
117.43-3	Red	3-3	+	L	"
189.45-6	Pale	2-4	+	L	Replicate
204.43-1	Red	1-4	+	L	"
209.43-1	"	3-5	+	M	Observation
217.43-3	"	2-4	+	L	Replicate
225.43-1	"	2-4	+	M	Observation
311.43-1	"	2-4	+	L	"
Dazoc	"	4-4	+	M	Replicate
Redglo	"	1-3	+	M	"
Sheridan	"	3-4	+	L	"

Submitted by Julian C. Miller, Louisiana

Desoto	Pale	1-3	+	L	Replicate
LaSoda	"	2-5	+	L	"
Red LaSoda	Red	2-4	+	L	"
82-94	"	2-2	+	L	Observation
82-269	Pale	2-2	+	M	Replicate
92-23	Red	T-1	+	M	Replicate
92-105					Rogued
92-167	Red	T-3	+	L	Replicate

N. Dak. table 14 continued.

Designation	Color	Scab	Race O L. blight	Maturity	Designation
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Submitted by R. H. Johansen and J. H. Schultz, North Dakota

2124-2R	Red	1-3	+	M	Replicate
2124-20R	"	1-3	+	L	"
2200-1R	"	1-2	+	L	Observation
2555-6R	"	1-2	+	M	Replicate
2555-12R	"	1-3	+	M	"
2569-4R	"	2-3	+	L	"
2728-20R	"	3-2	+	M	"
2774-3R	"	2-1	+	E	"
2799-5R	"	2-2	+	M	"
2910-1R	"	1-3	+	M	"

Submitted by Wm. G. Hoyman, North Dakota

Red Pontiac	Red	1-3	+	M	Replicate
Redkote	Red		+	L	"
Kennebec	White	3-4	-	L	"
Cherokee	White	1-3	-	M	"
Early Gem	Russet	T-2	+	E	"
I803-3	White	1-2	-	E	"

Nine additional selections^{3/} grown at Langdon, N. Dak., were included in the Texas shipment. These were supplied by R. H. Johansen and J. H. Schultz.

457-1-10	White		+	E	Replicate
457-1-16	"		+	E	"
457-1-35	"		+	L	Replicate
457-1-36	"		+	L	Replicate
2231-2	"		+	L	"
2906-1R	Red		+	E	"
3022-18	White			M	"
3203-6R	Red			M	"
19100-3	White			L	"

1/ A light shade of red.

2/ Positive means infected and negative resistant.

3/ Complete disease readings were not available on the 9 additional selections.

Most of the selections were red but there were a few whites and one russet. Scab is prevalent in this vicinity so it was possible to obtain a scab reading at harvest. During August a late-blight test was conducted on all the entries that had not been rogued by using the detached leaf method. The disease readings appear in the table.

It might be advisable to mention that some of the stock was badly infected with certain viruses and it was necessary to rogue weekly. Virus Y symptoms were the most common, followed by spindle tuber and leaf roll.

When the plot was harvested September 23, 53 of the most promising ones were selected to be replicated at Weslaco. Nine additional selections grown at Langdon, North Dak., were supplied by the North Dakota Department of Horticulture. Those selections not appearing too promising were sent in small lots for observational rows. There were 30 of these and the remaining selections were dropped because of late maturity and small tuber size.

Two tubers of each of the 62 selections to be replicated at Weslaco were sent to John Noonan, Subtropical Experiment Station, Homestead, Fla., for an observational planting in order to determine what selections were adapted to Florida.

The Development of Potatoes Immune to Virus X

In 1953 a few seedling progenies were screened for immunity to virus X. This work was continued on a much larger scale in 1954. Progenies from the Department of Horticulture are shown in N. Dak. table 15. Since immunity to virus X is easy to obtain, most of the subsequent stock grown at the North Dakota Agricultural Experiment Station should have immunity to this virus.

N. Dak. table 15. Department of Horticulture progenies screened for immunity to virus X.

Pedigree	Parentage	Pedigree	Parentage
3924	Redkote x B 2876-1	4006	3202-1 x B 3131-8
3926	Redkote x B 3131-8	4007	3202-7 x B 3131-8
3932	457-1 x B 3131-8	4011	3247-2R x B 3131-8
3934	457-1 x B 2876-1	4012	3247-2R x B 2876-1
3937	457-1-4 x B 2876-1	4016	3255-1 x B 3131-8
3940	457-1-10 x B 3131-8	4021	3144-1 x B 2876-1
3941	457-1-10 x B 2876-1	4023	3185-1 x B 3131-8
3944	457-1-16 x B 2876-1	4026	3291-5 x B 2876-1
3946	888-8-1R x B 2876-1	4029	3291-5 x B 3131-8
3951	2124-16R x B 3131-8	4033	3295-6 x B 3131-8
3955	2387-1 x B 3131-8	4041	3297-2 x B 2876-1
3959	2475-8 x B 2876-1	4042	3297-2 x B 3131-8
3961	2555-6R x B 2876-1	4043	3297-2 x B 3131N3
3962	2569-4R x B 2876-1	4044	3297-2 x I801-10

N. Dak. table 15 continued

Pedigree	Parentage	Pedigree	Parentage
3965	2569-4R x B 3131-8	4071	B 2876-1 x 457-1
3967	2780-6R x B 2876-1	4073	B 2876-1 x B 2976-2
3968	2780-6R x B 3131-8	4074	B 2876-1 x 3185-1R
3970	2780-8R x B 2876-1	4093	B 3131-8 x 457-1
3973	2786-1 x B 2876-1	4094	B 3131-8 x 457-1-10
3977	2910-1R x B 3131-8	4095	B 3131-8 x 3183-1R
3981	2976-2R x B 2876-1	4096	B 3131-8 x 3185-1R
3982	2976-2R x B 3131-8	4097	B 3131-8 x 2910-1R
3999	3047-1 x B 3131-8	4116	CS9947 x B 3131-8
4004	3070-5R x B 3131-8	4134	M24 x B 2876-1

N. Dak. table 16. U.S.D.A. progenies screened for immunity to virus X.

Pedigree	Parentage	Pedigree	Parentage
F26	Early Gem x B 2876-1	F39	I947-W18 x B 2876-1
F27	B 2876-1 x Early Gem	F40	B 3131N1 x B 2876-1
F28	I803 x Early Gem	F41	B 2368-4 x I803-3
F29	Early Gem x I803-3	F42	B 3131N2 x B 2876-1
F32	B 3131N2 x Early Gem	F43	Redkote x B 2876-1
F33	B 3131-8 x Early Gem	F44	B 2368-4 x B 2876-1
F34	I803-3 x B 3131-8	F45	B 3131N1 x I803-3
F35	B 3131-8 x I803-3	F46	B 3131N3 x B 2876-1
F36	B 2876-1 x I803-3	F47	I1049-3 x B 3131-8
F37	I803-3 x B 2876-1	F48	I1049-3 x B 2876-1
F38	I947-W18 x B 3131-8	F49	41956 x Early Gem

Antibiotics

During the spring of 1954, 18 antibiotics were obtained from various sources and tested for late-blight control. The experiments were conducted in the late-blight chamber by using detached leaves and potted plants. The antibiotic concentrations varied from 62.5 to 500 ppm. N. Dak. table 17 lists the antibiotics and the source of each.

N. Dak. table 17. Antibiotics used in an attempt to control late blight.

Sample Number	Names	Sources
1	Amphomycin Na Lot #105	Bristol Laboratories
2	Ilotycin (Erythromycin) No. Ik422	Lilly Laboratories
3	Etamycin Base No. 1705-1-B	Bristol Laboratories
4	Potassium Penicillin G No. C3459	" "
5	Streptomycin Sulfate No. K3681	" "
6	Helixin B No. 1V-17-A	Wisconsin University
7	Crude Terramycin	Chas. Pfizer & Co.
8	Procaine Penicillin 53R3520	Merck & Co.
9	Neomycin 54R734	" "
10	Bacitracin 54R733	" "
11	Pleocidin 53R2748	" "
12	Streptothricin Hydrochloride 52R4009	" "
13	Candicidin 54R1756	" "
14	Hygromycin	Lilly laboratories
15	Terramycin Hydrochloride	
16	M-16441	Lilly laboratories
17	M-16655	" "
18	Acti-dione	The Upjohn Company

The results of this preliminary research indicated that No. 2, Ilotycin, gave fairly good control of late blight. The antibiotics Etamycin, M-16655, and Acti-dione were phytotoxic.

Early Gem

The Early Gem acreage continued to increase in 1954. Several growers in the Valley tried it for the first time. There were 45 applications to the State Seed Department for certification and the total of this acreage amounts to 947.25. The certified acreages for 1951, 1952, and 1953 were 5.6, 83.4, and 445, respectively.

Some reports were received that this variety was being grown at certain locations in Minnesota. One of the areas was the early market district near Minneapolis at Osseo. Henry Peterson at Moorhead, Minn., has grown it for 2 years and has indicated it is a better variety for him than Red Warba.

There was a good demand for seed for the 1954 planting within and outside of the State. Several carloads went to Idaho where this variety is favored in the early districts.

Because of the heavy August rains a considerable amount of growth cracking was expected but this was not the case. Mr. Harold Njaa of Northwood did not kill the vines and the tubers were the largest I have ever seen. There was very little cracking or very few tubers with knobs.

Some early August shipments brought between \$3 and \$4 per hundred in Chicago and this was approximately \$1 more than the early red varieties were bringing.

Increase and Maintenance of Federal Stock From the Iowa Agricultural
Experiment Station

In order to increase and maintain advanced selections, Dr. C. E. Peterson and Dr. Wm. J. Hooker have had an isolated plot at Northwood during each of the last few years. The plot is located on the Vannesland Farm where scab is severe enough to get satisfactory readings on the susceptible selections. In addition to the usual practices in maintaining such a plot, it is observed each week and any questionable plants are removed. This year's plot contained 419 selections and varieties. Because the Iowa plot at Clear Lake, Iowa, was flooded and lost, it is fortunate these advanced selections were duplicated at Northwood. I803-3 was one of the most promising advanced selections increased in 1954. It has resistance to scab and late blight, and immunity to virus X.

NORTH DAKOTA

J. H. Schultz and Robert Johansen

The problem, objectives, and plan of work in potato breeding for North Dakota remain essentially the same as reported in the 1951 report.

Variety Yield Trials

Three types of variety yield trials were grown in North Dakota during 1954. They are referred to as Red variety trial, State-wide variety trial, and North-Central regional variety trial.

All variety yield trials were grown as randomized blocks with 4 replications of 25 plants per variety. All trials were dusted or sprayed regularly to control potato insects, but no fungicides were applied. Fertilizers were applied as a band at planting time. Locations, soil types, and fertilizer treatments used were as follows:

Location	Soil Type	Fertilizer	
		Ratio	Lbs./A
Fargo	Fargo Clay	---	---
Grand Forks	Bearden Clay Loam	0-30-15	200
Park River	Vlen Sandy Loam	---	---
Williston Dryland	Williams Loam	0-45-0	175
Williston Irrigation	Havre Silty Clay Loam	16-22-0	350
Minot	Williams Silt Loam	---	---

Red Variety Trial

The red variety trial, which consisted of 21 varieties and selections, was grown near Grand Forks. Yield, percentage of U.S. No. 1, and specific gravity data from this trial are reported in Schultz table 1. The most promising selection in this trial was ND2910-1R which is in the same yield and maturity class as Red Pontiac. It is superior to Red Pontiac in table quality, specific gravity, tuber type, and skin characteristics. There was little if any distinct difference between the 2 strains of Triumph. Redkote has appreciable scab resistance and higher specific gravity when the tubers are well matured. It seems to tuberize and mature rather late under certain conditions. The selections, ND2906-1R and ND2774-3R, are early. Hollow heart has been a problem with ND2569-4R under some conditions. The flaky, russet-skin type on ND2124-2OR is of interest because of resistance to abrasion, but consumer acceptance of this skin type in a red potato is not known.

Schultz table 1. Red variety trial. Total yield in bushels per acre, percentage U.S. No. 1, and specific gravity of red varieties and selections grown at Grand Forks, 1954.

Variety	Yield per acre		Specific $\frac{1}{2}$ gravity
	Total	U.S. No. 1	
	Bu.	Pct.	
ND2910-1RX	566	92	1.073
ND2910-1R	506	91	1.076
Red Pontiac	498	98	1.068
ND2200-1R	473	94	1.074
Early Triumph	463	96	1.074
Redkote	451	95	1.075
Redburt	450	94	1.073
ND2906-1R	438	97	1.072
ND2814-5R	425	99	1.080
Satapa	418	89	1.078
Triumph	404	96	1.071
Red Warba	394	96	1.085
ND2799-5R	389	98	1.073
Progress	383	94	1.074
ND2124-2OR	349	94	1.074
ND2124-2R	323	97	1.076
ND2728-2OR	291	94	1.080
ND2555-6R	290	96	1.074
ND2555-12R	283	95	1.081
ND2774-3R	260	96	1.079
ND2569-4R	253	97	1.084
Average	396	95	1.076
L.S.D. 5%	73		.0057
" 1%	97		.0079

1/ Specific gravity was determined by the use of the National Potato Chip Institute potato hydrometer, using an 8-pound sample from each 2 replications.

State-wide Variety Trial

The State-wide variety trials were grown at Fargo, Grand Forks, Park River, Minot, and with and without irrigation at Williston. These trials included 16 varieties and selections grown at all locations with an additional 4 selections grown only at Fargo, Grand Forks, and Park River. Data from these trials are presented in Schultz tables 2 and 3.

Schultz table 2. Total yield in bushels per acre and average percentage U.S. No. 1 potatoes grown in State-wide variety trials, 1954.

Variety	Yield per acre and location						Average	
	Park River	Fargo	Grand Forks	Minot	Dryland	Williston Irrigation	Yield	U.S. No.1
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Pct.
Red Pontiac	315	704	566	293	334	562	462	91
I. Cobbler	249	629	480	285	259	602	417	88
Triumph	268	665	445	257	280	536	408	86
ND457-1-16	301	552	478	222	269	571	399	81
Redkote	241	588	461	288	316	455	391	88
ND457-1-10	280	506	479	236	240	575	386	86
ND2231-2	302	488	486	214	270	538	383	91
Early Gem	232	596	481	281	210	499	383	81
Manota	241	481	416	215	236	544	355	87
ND2555-6R	198	607	344	187	202	494	339	89
ND2124-20R	228	489	404	220	208	460	335	90
ND457-1-4	267	409	352	253	235	457	329	94
ND2728-20R	153	550	355	206	194	493	325	86
ND2555-12R	207	514	320	203	192	497	322	92
ND2475-8	191	403	298	124	170	398	264	85
ND2124-2R	193	380	295	144	120	325	243	93
ND2906-1R	246	538	489				423	96
ND2799-5R	237	537	388				387	95
ND457-1-36	227	485	389				367	92
ND457-1-35	228	472	317				339	96
Ave. of 1st 16 varieties	242	535	416	227	233	500	359	88
L.S.D. 5% (1st 16 varieties	60	123	64	46	35	95	108	
Do 1%							143	

Schultz table 3. Specific gravity of potatoes grown in State-wide trials in 1954 ^{1/}

Variety	Park River	Fargo	Grand Forks	Minot	Williston		Average
					Dryland	Irrigation	
ND2728-20R	1.086	1.085	1.087	1.084	1.085	1.082	1.0848
I. Cobbler	1.085	1.079	1.088	1.086	1.080	1.081	1.0832
ND2231-2	1.087	1.080	1.086	1.079	1.085	1.082	1.0832
Manota	1.086	1.081	1.088	1.075	1.082	1.077	1.0815
ND2124-20R	1.081	1.082	1.085	1.073	1.079	1.082	1.0803
ND457-1-16	1.084	1.080	1.078	1.079	1.085	1.071	1.0795
ND457-1-10	1.083	1.073	1.078	1.078	1.085	1.074	1.0785
Redkote	1.084	1.073	1.081	1.073	1.075	1.080	1.0777
Triumph	1.077	1.078	1.081	1.071	1.083	1.074	1.0773
ND2475-8	1.076	1.074	1.081	1.072	1.080	1.076	1.0765
ND2555-12R	1.078	1.074	1.081	1.075	1.081	1.069	1.0763
ND2555-6R	1.078	1.074	1.080	1.072	1.081	1.070	1.0758
ND2124-2R	1.078	1.074	1.077	1.071	1.077	1.076	1.0755
ND457-1-4	1.078	1.074	1.075	1.076	1.073	1.075	1.0752
Early Gem	1.071	1.073	1.076	1.075	1.074	1.076	1.0742
Red Pontiac	1.073	1.066	1.074	1.065	1.071	1.070	1.0698
ND457-1-36	1.084	1.075	1.082				1.0803
ND2799-5R	1.080	1.072	1.080				1.0767
ND457-1-35	1.079	1.073	1.076				1.0760
ND2906-1R	1.068	1.072	1.076				1.0720
Ave. of 1st 16 varieties	1.080	1.081	1.076	1.075	1.080	1.076	1.0781
L.S.D. 5% (1st 16 varieties							0.0034
Do 1%							0.0045

^{1/} Specific gravity was determined by the use of the National Potato Chip Institute potato hydrometer, using an 8-pound sample from each of 2 replications.

Red Pontiac was the highest yielding variety in the trial with an average total yield of 462 bushels per acre at 6 locations. It was also the highest yielding variety at each location in bushels of U.S. No. 1 potatoes per acre but was fourth in total yield at Williston under irrigation. The 3 rather new varieties, Early Gem, Manota, and Redkote, were intermediate in yield and their average yields at 6 locations were not significantly different.

Data on specific gravity are presented in Schultz table 3. The 16 varieties that were grown at all 6 locations averaged 1.080 to 1.081 in specific gravity at Park River, Grand Forks, and with dryland culture at Williston, and from 1.075 to 1.076 at the other 3 locations. Red Pontiac was lowest in average specific gravity, followed by Early Gem. Redkote and Triumph averaged essentially the same this year, whereas Cobbler and Manota were highest among named varieties.

On the basis of our trials, some evaluation of Early Gem, Manota, and Redkote in North Dakota may be made. Manota has not had a good commercial trial in North Dakota, but it will be limited to scab-free soils at best. It is comparable to Cobbler in many respects except that it has superior tuber type, table quality, and very shallow eyes, but may not chip and french-fry as well. Early Gem has excellent scab resistance and is at its best on the coarser textured soils where scab also presents a serious problem. Susceptibility to growth cracks on the finer textured or clay soils of the Red River Valley made normal commercial production hazardous on some farms-- yet for special purposes, such as early harvesting or with supplemental irrigation, the variety may do well on such farms. Red Pontiac and Early Gem are similar in specific gravity and flesh texture. Redkote has more scab resistance than Triumph or Red Pontiac and may be considered as a replacement for these varieties where more scab resistance in a red variety is required. On the basis of the rather typical yields shown in Schultz table 2, it is obvious why many growers find it rather difficult to turn from Red Pontiac to other named red varieties at present.

Among numbered white selections in the State-wide trial, ND2231-2 rated high in tuber type and quality. Of the five selfed lines of ND457-1 grown in this trial, ND457-1-10 seems to be the most promising as a commercial variety.

North Central Regional Variety Trial

The North-central regional variety trial included North Dakota entries, ND457-1-16, ND2231-2, and ND2124-20R. This trial, which consisted of 16 entries, was grown on the Red River Valley Potato Growers Research Farm near Grand Forks, N.D. The results from this trial are being reported co-operatively by the North Central states.

Potato Crossing Program

Two hundred twenty-six controlled crosses were made and nine lines were self-pollinated in the greenhouse in 1954. The crossing program was started on February 20 and completed on May 15, with the seed being extracted from the seed balls the first 2 weeks in June. Most of the varieties and selections used as parents on at least one side had a high degree of resistance to one or more diseases, particularly scab, late blight, virus X, and virus Y. Special emphasis has been placed in developing an early red tuber variety with a high degree of scab resistance.

Greenhouse and Field Seedlings

Approximately 27,000 seedlings from controlled crosses were grown in the greenhouse. These seedling tubers were harvested in November and December and stored in the potato cellar for planting next spring at the Langdon Experiment Station, where preliminary field selections will be made in the fall of 1955.

Late blight and virus X inoculations of seedling families bred for resistance were again made in co-operation with Dr. W. G. Hoyman. Approximately one-third of the seedlings inoculated were eliminated by transplanting time as a result of seedling inoculation with these two diseases.

Approximately 18,000 first-year seedlings were grown in the field at the Langdon Experiment Station. From these, approximately 800 clones were selected at harvesttime for further testing and evaluation. A large percentage of the clones selected at harvest had either a red or russet skin and possessed some X immunity, and scab and late blight resistance.

Advanced Selections

Advanced selections were grown under isolation from virus diseases at the Langdon Experiment Station and with variable field exposure to various diseases at Grand Forks.

A summary of seedlings and selections grown and those saved for further testing follows:

<u>Age of Clones</u>	<u>No. Grown</u>	<u>No. Selected</u>
1st year seedlings	18,000	800
2nd year seedlings	509	119
3rd year seedlings	84	46
4th year and older seedlings	35	29

Testing for Disease Resistance

The greenhouse test for field resistance for Y virus was again conducted in 1954. One thousand two hundred eighty-three second-sized potato seedlings of families having ND457-1 as one parent were planted in individual $3\frac{1}{2}$ -inch pots on June 26. Individual potted plants of Y-carrying ND530 were distributed throughout the planting. On July 22, after all seedlings were approximately 6 inches in height, viruliferous aphids were placed on the ND530 plants and as many seedling plants as the supply of aphids permitted. On August 22, when severe symptoms were showing, all plants were nico-fumed to kill the aphids, and on

August 23 all susceptible plants were rogued out. Three hundred ninety-five individual plants at this time showed no symptoms and were harvested on November 2. After harvest, these individual seedling clones were stored in the potato cellar and will be tested again during the winter months for resistance or susceptibility to virus Y. All resistant lines will be planted in the field during the summer of 1955.

Eleven lines from the 1953-1954 greenhouse Y virus test were planted in the field during the summer of 1954. Viruliferous aphids were placed on these lines during the summer. Eight of the original lines showed no infection and were harvested for further testing and study.

It is apparent, from the work on resistance to virus Y in ND457-1 and material derived from this selection, that we are not dealing with immunity to virus Y, as is the case with virus X in other selections, but rather a high level of field resistance and that this resistance is inherited and can be transmitted to seedling progenies.

One of the immediate problems is to improve techniques for separating the resistant from the susceptible seedlings. Since we are dealing with a high level of resistance but not immunity, it follows that even our most resistant selections can be infected with virus Y if given a sufficiently severe exposure.

Three hundred twelve second-year advanced selections, eighty-four third-year selections, and thirty-four fourth-year and older selections were grown in the Fargo scab trial during 1954. The 118 third-year and older advanced selections were also grown in the Northwood scab trial. Favorable scab tests were obtained in both of these trials. All of this work is being done on disease resistance in cooperation with Dr. Hoyman of the Plant Pathology Department.

OHIO

J. P. Sleesman

The objective of the work in Ohio, in cooperation with the U.S.D.A., is to develop a high-yielding, high-quality variety of potato of satisfactory maturity which is resistant to the potato leafhopper. Some individuals would question the value of this work since insects can be controlled adequately with insecticides. However, if leafhopper resistance could be combined with resistance to foliage diseases in a single variety, the need for costly applications of pesticides at close intervals would be decreased greatly.

The 1954 growing season was unusually dry, hot, and generally unfavorable to growth of potatoes. Yields, especially of varieties of early and mid-season maturity, were low. Leafhopper and flea beetle populations, on the other hand, were high and most of the seedling selections were severely damaged by both of these insects. The potato leafhopper is by far the more important of the two above-mentioned insects, and the seedlings which escaped injury by the leafhopper generally failed to meet the requirements of commercially acceptable variety. In most instances, the tubers produced by the resistant seedlings were coarse and misshapen or of small size due to late maturity. A leafhopper-resistant variety of mid-season maturity with good yielding ability producing high-quality tubers has not been developed.

Approximately 3,400 seedlings, representing 19 progenies, and 3,200 seedlings, representing 17 progenies, were received from Drs. Peterson and Stevenson, respectively. Many of these progenies were segregating for resistance to hopperburn, and approximately 10% were retained for further study. In general, the seedlings that were the most resistant to the leafhopper remained green until frost and produced low yields of worthless tubers.

The most interesting progeny was that resulting from the cross (*Solanum chacoense* x *Menominee*) x Cherokee. . Of the 174 individuals studied 66.1% showed class 1 hopperburn (0 to 10% of leaf area injured) with an average nymph population of 4.31 per 10 leaves; 18.4% showed class 2 hopperburn (11 to 25% of leaf area injured) with an average of 12.13 nymphs per 10 leaves; and 15.5% showed class 3 hopperburn (26 to 50% of leaf area injured) with 16.85 nymphs per 10 leaves. Irish Cobbler check plants showed class 5 hopperburn (76 to 100% of leaf area injured) with 72.0 nymphs per 10 leaves. Unfortunately all of the resistant seedlings produced tubers that were undesirable for one reason or another, and only a few were saved for further study. It should be pointed out that *Solanum chacoense*, one of the parents in the above cross, is highly resistant to the potato leafhopper.

Approximately 150 selections were planted in 10-hill plots, most of which suffered considerable hopperburn. Consequently, only 5% were considered sufficiently resistant to warrant further trial.

The search for a source of leafhopper resistance was continued in a study of species material received from Dr. Hougas. Species found to be resistant to leafhoppers and flea beetles in 1953 were found to be resistant also in 1954. (See 1953 Ohio report.) Insectary studies have shown that nymphs placed on species found to be resistant in the field were unable to complete their development and died within a short time. This indicates that preference by ovipositing females is not a factor contributing to resistance in the field but that certain antibiotic factors are responsible. Whether antibiosis is related to maturity is not known.

PENNSYLVANIA

J. S. Cobb

Six early varieties of potato were tested for yield and total solids. Pa. table 1 gives the results of this test. Cobbler ranked No. 1 in yield but did not yield significantly higher than Cherokee or Redburt. Cherokee was higher than Cobbler in percentage solids.

Pa. table 1. Data on yields and percentage solids of 6 early varieties of potato, Pa. State University, Agr. Expt. Sta., 1954.

Rank	Variety	U.S. No. 1	Solids
		yield per acre	
		Bu.	Pct.
1	Cobbler (Potter Co.)	470	18.48
2	Cherokee (U.S.D.A.)	440	19.17
3	Cherokee (N.Y.)	439	20.02
4	Redburt (Minn.)	436	15.72
5	Cobbler (U.S.D.A.)	406	19.20
6	Early Gem (U.S.D.A.)	400	17.25
7	Early Rose (Maine)	388	19.66
8	Early Ohio	314	17.44
	L.S.D. between varieties (.05)	61	
	" " " (.01)	82	

Nine medium-maturing varieties were included in another test. The data for yield and percentage solids for this test are given in Pa. table 2. In this test Teton ranked first in yield and Canoga ranked first in dry-matter content. Pa. table 3 gives the data on yield and dry-matter content of 13 late varieties.

The yields of Red Pontiac (N. Y.), B 2368-4, Kennebec, and Saco were not significantly different. Several others were not far below this group in yield. Merimack with 22.15% was the highest in dry-matter content. Delus was second with 20.6% and Russet (N.Y.) was third with 20%.

Uniform Tests of Varieties

Twelve varieties were tested in uniform demonstration plots in the counties of Clearfield, Lehigh, Potter, Schuylkill, Somerset, and York. The yield data for these tests are given in Pa. table 4 and the percentage of dry matter for each of the 12 varieties are given in Pa. table 5.

Pa. table 2. Data on yields and percentage solids of 9 medium maturing varieties of potato, Pa. State Univ., Agr. Expt. Sta. 1954.

Rank	Variety	U.S. No. 1 yield	Solids
		per acre	
		Bu.	Pct.
1	Teton (U.S.D.A.)	600	17.68
2	Canoga (Potter Co.)	525	20.15
3	Pungo (U.S.D.A.)	517	18.91
4	Katahdin (U.S.D.A.)	500	18.42
5	Katahdin (Potter Co.)	477	18.50
6	Canoga (N.Y.)	472	19.40
7	Houma (U.S.D.A.)	468	18.66
8	Katahdin (Me.)	462	17.90
9	Katahdin (E. States)	458	19.89
10	Houma (Potter Co.)	407	18.40
11	Keswick (Potter Co.)	366	19.42
12	White Cloud (Nebr.)	365	18.00
13	Manota (Ga.)	342	17.90

L.S.D. between varieties (.05) 77
 " " " (.01) 105

Pa. table 3. Data on yields and percentage solids of 13 late varieties of potato Pa. State Univ., Agr. Expt. Sta. 1954

Rank	Variety	U.S. No. 1 yield	Solids
		per acre	
		Bu.	Pct.
1	Red Pontiac (N.Y.)	635	16.36
2	B 2368-4 (U.S.D.A.)	603	18.24
3	Kennebec (U.S.D.A.)	587	18.70
4	B 606-67 (U.S.D.A.) Saco	583	18.91
5	Red Pontiac (Potter Co.)	567	16.47
6	Ontario (N.Y.)	565	18.20
7	B 335-35 (U.S.D.A.)	562	18.00
8	Kennebec (N.Y. 4)	557	19.17
9	B 355-44 (U.S.D.A.) Merrimack	555	22.15
10	Essex (N.Y.)	537	16.48
11	Kennebec (N.Y. 8)	528	18.80
12	Canus (Potter Co.)	525	16.60
13	Russet (N.Y.)	515	20.00
14	Sebago (Nixon)	495	18.68
15	Russet (Ithaca)	482	18.90
16	White Rural (N.Y.)	475	19.17
17.	B 73-18 (U.S.D.A.) Delus	468	20.60
18.	B 73-10 (U.S.D.A.)	448	18.91
19	Russet (Misch. Farms)	387	18.02

Pa. table 4. Pennsylvania extension uniform potato variety demonstrations - yield of 12 varieties tested in 6 counties of Pa., 1954.

Variety	Counties and yield per acre											
	Clearfield	Lehigh	Potter	Schuylkill	Somerset	York	Average	6 demons.				
	Total U.S. 1	Total U.S. 1	Total U.S. 1	Total U.S. 1	Total U.S. 1	Total U.S. 1	Total U.S. 1	Total U.S. 1	Total U.S. 1	Total U.S. 1	Total U.S. 1	Total U.S. 1
Early	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Pct.	Bu.
Irish Cobbler	407	297	225	367	228	339	241	542	531	154	112	350
Manota	405	365	216	394	363	328	246	484	460	145	100	340
White Cloud	347	132	188	311	273	291	181	382	348	137	77	276
Medium Season												
Red Pontiac	593	261	217	417	359	459	372	879	844	213	164	463
Kennebec 1/	515	252	313	338	277	496	343	838	746	164	115	444
Katahdin	531	334	373	374	337	414	335	576	559	184	154	409
Redburt	479	326	256	379	288	433	346	597	585	177	120	387
Canus 1/	445	102	351	367	250	349	283	546	535	141	104	367
Keswick 1/	414	290	280	272	180	231	185	433	433	113	72	291
Cherokee 1,2/	333	260	145	249	184	298	209	540	464	92	67	276
Late												
Russet Rural	711	597	501	424	365	420	160	875	805	173	69	517
Canoga	649	428	234	431	336	503	398	821	756	190	139	471
L.S.D. (.05)		16.13	6.05		11.25		5.52		21.15		7.68	
" (.01)		22.01	8.16		15.16		7.44		28.52		10.35	

1/ Resistant to the common race of blight but susceptible to a new race that is becoming widespread. Should be sprayed the same as a blight-susceptible variety.

2/ Scab-resistant.

*Planted 32 inches between rows, 9 inches apart in row.

**Planted 34 inches between rows, 9 inches apart in row

Pa. table 5. Percentage solids in the tubers of 12 varieties of potato grown in 6 counties of Pa., 1954.

Variety	Clearfield County solids	Lehigh County solids	Potter County solids	Schuylkill County solids	Sommerset County solids	York County solids	Average solids
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Irish Cobbler	17.8	18.0	20.8	19.9	19.4	18.2	19.1
Keswick	19.4	18.2	20.1	19.7	18.6	18.0	19.1
Cherokee	20.4	17.2	21.4	19.4	18.6	16.9	19.1
Russet Rural	19.9	18.2	22.7	17.6	18.9	16.9	19.1
White Cloud	17.6	18.4	21.4	19.1	17.8	19.4	19.1
Kennebec	19.6	18.4	22.1	16.7	18.0	16.2	18.4
Manota	17.2	17.2	21.1	19.6	17.6	16.7	18.2
Canoga	19.6	15.5	23.2	17.4	18.4	15.3	18.0
Katahdin	18.4	17.2	20.9	17.8	17.2	15.3	18.0
Redburt	16.4	16.4	19.1	17.4	17.2	18.4	17.6
Canus	16.2	16.2	18.4	16.7	16.0	15.7	16.7
Red Pontiac	15.7	14.0	19.1	15.1	14.5	14.7	15.7

The greateat variation in percentage solids of the same varieties in the several counties is worthy of notice. Russet Rural, for example, had 22.7% solids grown in Potter County but only 16.9% in York County. Other varieties showed similar differences.

The information presented in Pa. tables 4 and 5 was prepared by the Extension Section of Agronomy, Agricultural Economics, Entomology, and Plant Pathology in cooperation with the Agronomy staff of the Pa. Agricultural Experiment Station.

PENNSYLVANIA
R. E. Hartman

The wart immunity test in this area was again unsuccessful due to our third bad drought year. The soil moisture test in Sullivan County where the experimental plots were located showed less than 50% saturation during the growing season.

We came to the end of our field experiments with the close of this season, as all wart infested experimental areas along with the last season's infested gardens were placed under eradication this fall and such areas chemically treated for the destruction of the remaining wart organisms.

RHODE ISLAND
J. E. Sheehan

The 1954 growing season at Kingston was rather unusual. Several rainfall records were established, and on August 31 a severe hurricane smashed across the State. This was also one of the coolest summers in Rhode Island since that of 1946. R. I. table 1 gives the average rainfall and temperatures throught the 1954 growing season.

R. I. table 1. Rainfall and temperature for the 1954 growing season at Kingston, R. I. Rainfall in inches.

	May	June	July	August	Sept.
	In.	In.	In.	In.	In.
Normal	3.86	3.46	3.34	4.30	3.90
Actual	5.63	1.75	2.55	9.77	7.0
Departure	+1.77	-1.71	.79	+5.47	+3.1
Temp. °F					
Normal	55.0	63.6	69.2	68.0	61.9
Actual	54.3	64.7	67.3	65.8	60.4
Departure	- .7	+ 1.1	- 1.9	- 2.2	- 1.5

The cool days and moisture supply were evidently quite satisfactory for potato production. Droughty soils produced excellent crops of potatoes this year.

A comparison of 20 varieties was made at the Rhode Island Experiment Station. The plots selected for the test had a clover timothy seeding the previous year, and prior to that were in corn. Granular cyanamid at the rate of 300 pounds per acre was broadcast before plowing. An 8-12-12-2 fertilizer at 2,000 pounds per acre was applied in bands at planting time. The soil is classed as Bridgehampton, very fine sandy loam.

Yields were calculated from 32-foot rows, replicated 4 times. Seed pieces were spaced 1 foot apart in the row, with 3 feet between rows. The potatoes were planted on April 20 and harvested September 30. The vines that were still actively growing on August 31 were severely damaged by high winds which beat them down to the ground. Consequently, the later-maturing varieties probably did not yield as high as they ordinarily would have.

A portion of the data obtained are given in R. I. table 2. B 606-67, now named Saco, was the highest yielding variety but was not significantly higher than Teton, Pontiac, Green Mountain, Sebago, Kennebec or Chippewa. While the overall yield was somewhat lower than that of last year, the average total dry matter was considerably higher.

Keswick was the leading variety in starch content, but, as in previous years, total yield was very poor. Following Keswick in dry-matter content were Mohawk and Saco. Saco has proved to be a high-yielding high-quality potato in the Rhode Island trials.

Due to cool humid weather conditions, infections of early and late blight were prevalent during the growing season. The infestation of early blight was classified as light, and late blight as moderate on all varieties. There were no other disease problems of any consequence on any of the 20 varieties.

Insect damage was relatively light with flea beetles causing the major portion, followed by aphids. Neither built up to what was considered more than a medium level of population.

The spray interval was determined by insect hatch-cycles and actual field population estimates along with a late blight forecasting system.

Chemicals used were 50% wettable DDT, liquid Parzate, 40% Nicotine Sulfate and 8-4-100 Bordeaux. The DDT was applied at the rate of 2 pounds per acre, Parzate at 2 quarts and 3 quarts as blight incidence increased, and Nicotine Sulfate at 1 quart per acre. All chemicals were applied in 100 gallons of water per acre.

R. I. table 2. Yield and other data on 20 potato varieties grown at Kingston, R. I., 1954.

Variety	Yield per acre U.S. No. 1		Dry matter	Days to maturity	Tuber	
	Bu.	Pct.			Size	Shape
Saco(B606-67)	604	99.0	18.9	132	Med. large	Smooth regular
Teton	564	98.7	16.8	143	Large	" "
Pontiac	561	97.8	15.4	132	Large	Medium regular
Gr. Mountain	551	98.2	18.1	143	Medium	Medium irregular
Sebago	542	97.0	15.8	143	"	Smooth regular
Kennebec	529	98.1	16.5	132	Large	" "
Chippewa	502	97.2	16.4	133	"	" "
Pungo	486	98.0	17.7	127	"	" "
Ontario	484	94.3	15.7	153	Medium	" "
Mohawk	478	99.1	19.2	143	"	" "
Russet Rural	471	97.4	18.6	143	"	Medium regular
Sequoia	463	97.1	16.2	155	Large	Smooth regular
Menominee	458	97.3	17.4	148	Medium	Rough irregular
Katahdin	448	97.9	17.0	135	"	Smooth regular
Cherokee	444	97.0	17.9	122	"	" "
Erie	379	95.1	16.5	138	"	" "
Irish Cobbler	362	96.3	18.2	118	"	Rough irregular
Warba	338	95.3	17.7	122	"	" "
Canso	330	97.1	17.6	127	"	" "
Keswick	285	96.8	19.4	127	"	Smooth regular

L.S.D. at .05 = 109 Bu/A

South Carolina
William M. Epps

The 1954 season was marked by early and late season droughts with enough rain during midseason to make a good yield of high quality potatoes. Stands were near perfect, and no disease or insect was sufficiently prevalent to effect a measurable reduction in yield or quality. The early varieties were already approaching maturity in early May when the rains came, and they were unable to resume growth as the later varieties did. For this reason yields of the early varieties were mostly very low. The harvest of the late varieties was delayed by 7-10 days, but yields were high.

Plot size and number of replicates were dependent on the quality of seed available. Test G (S. C. table 1) contained four replicates with 36' single row plots. Test J (S. C. table 2) had 3 replicates with 16' single row plots, and test H (S. C. table 3) had a single plot of each seedling with 5-16 hills.

The following data cover the details of these experiments:

Fertilizer used:	1600 lbs. 6-8-6 per acre.
Date of planting:	1-2 February
Dusting:	2 applications 2½% DDT-6% copper dust.
Vine killing:	Sprayed June 2 Penite 6
Date of harvest:	Test G (S.C. table 1) June 3. Test H & J (S.C. tables 2-3) June 10.

The only yield data recorded were total yields. The percentage of size B's and various defects was so small as to be negligible except in B 606-67.

The following data were recorded and are reported for each variety in the test: total yield, total solids (specific gravity), and observational data on maturity, shape, color, and defects. Promising varieties and seedlings were exposed to direct sun to determine the rate of breakdown of the exposed tubers.

Observations:

Pungo	Round but rough and irregular in shape.
B 606-67	Tubers rough, almost all large tubers with second growth giving a knobby appearance. Some sprouting at harvest.
B 355-35	Brown flecks in flesh of every tuber- internal brown spot associated with heat and drought at harvest. Otherwise an attractive potato.
B 75-4	An extremely attractive, early potato. Tubers nearly perfect in shape.
B 69-16	Scalded badly in scald tests for several years.
B 355-44	Scalded badly (first year only).
Delus	A fairly attractive, smooth oval white potato.

Worthy of further tests:

Delus, B 75-4, and B 355-44

For discard:

Pungo and B 606-67 for roughness.

B 355-35 for susceptibility to internal brown spot.

B 69-16 scalded badly as in previous tests.

S. C. table 1. Comparison of potato varieties and advanced seedlings, 1954
(test G).

Variety	Seed source	Yield per acre	Solids ^{4/}	Matur- ity ^{1/}	Skin ^{2/} color	Flesh color	Eyes	Shape	Scald ^{3/}
		Bu.	Pct.						Pct.
Pungo	Maine	485	18.2	M	S. Rus.	White	Deep	Round	30
B 606-67	"	485	18.2	ML	White	"	Shallow	Rough	-
Pontiac	N. D.	482	15.7	M	Red	"	Medium	"	-
B 69-16	Maine	485	17.9	ML	White	"	"	Oval	71
Sebago	"	435	17.4	L	"	"	Shallow	"	26
B 355-35	"	433	17.2	L	"	"	"	"	43
Sebago	PEI	398	16.9	L	"	"	"	"	-
B 355-44	Maine	372	18.2	L	"	"	Medium	Round	83
Delus	"	353	19.9	ML	"	"	Shallow	Oval	45
Cobbler	PEI	337	19.9	E	"	"	Deep	Round	-
Triumph	N. D.	263	17.3	E	Red	"	Medium	"	-
B 75-4	Maine	257	19.9	E	S. Rus.	"	Shallow	Oval	29
L.S.D. 19:1		42.3	.6						
99:1		56.8	.8						

1/ Maturity. E-Early; M-Midseason; L-Late.

2/ Skin color. S. Rus, refers to the slightly russeted color characteristic of the new scab-resistant seedlings.

3/ Percent of scald after 40 minutes exposure to direct sun. Temperature 84°F; Relative humidity 40%; Wind 20 m. p. h.

4/ Based on specific gravity.

S. C. table 2. Comparison of potato seedlings received from Crossville, Tenn., 1954 (test J)

Variety name or number	Yield per acre	<u>4/</u> Solids	<u>1/</u> Matur-ity	<u>2/</u> Skin color	Flesh color	Eyes	Shape	Remarks <u>3/</u>
	Bu.	Pct.						
3674	555	16.7	ME	S. Rus.	Cream	Shallow	Oval	(S)
Sebago	510	16.8	L	White	White	"	"	
Tag lost	500	17.1	L	"	"	Medium	Round	Rough Shape (D)
3953	490	16.8	M	S. Rus.	Cream	"	Oval	(S)
4773	490	17.5	ML	White	White	"	Long	(S)
4467	475	17.7	ML	"	"	"	Round	(S)
2109	470	19.9	L	S. Rus.	"	Shallow	Oval	Heavy set, sm. size (S)
4451	440	19.9	M	Russet	"	"	"	Skin scurfy (S)
2827	420	17.3	L	S. Rus.	"	"	"	(S)
3954	415	16.5	M	S. Rus.	Cream	"	"	Pointed ends (D)
2817	405	18.4	ME	White	White	Medium	"	(S)
2461	380	18.2	M	"	"	Shallow	"	(D)
4394	375	19.9	M	Russet	"	Medium	Round	(D)
4700	355	17.3	M	White	"	Shallow	Oval	Mixed seed (D)
3266	350	16.3	ME	S. Rus	"	"	Round	(S)
3279	260	17.9	E	White	"	"	"	Tubers too small (D)
4455	210	17.9	E	S. Rus.	"	"	Oval	(D)
2178	115	18.6	L	"	"	-	"	Mosaic severe and some sprouting (D)

LSD 19:1 75 0.7
99:1 101 0.9

1/ Maturity: E-Early; ME- Midearly; M-Midseason; ML-Mid-late; L-Late

2/ Skin color: S. Rus. - Slightly russeted.

3/ Remarks: (S) Save (D) Discard

4/ Based on specific gravity.

S. C. Table 3. Comparison of potato seedlings received from Presque Isle, Maine, and Crossville, Tenn., 1954. (test H)

Pedigree number	Yield per plot	Solids ^{4/}	Matur-ity ^{1/}	Skin ^{2/} color	Flesh color	Eyes	Shape	Remarks ^{3/}
	Lbs.	Pct.						
B2896-10	1.47	18.4	E	White	White	Shallow	Oval	Some second growth(S)
B3097-82	1.88	18.6	E	Rus.	"	"	"	(S)
B3114-6	2.25	15.7	E	S.Rus.	Cream	"	"	Rough (S)
B3172-13	1.06	18.4	VE	"	White			(D)
B3194-20	1.10	19.2	V	White	Cream	"	Round	(S)
B3311-2	1.31	19.7	E	Brown	Yellow	Medium	Oval	Russet brown (D)
<u>Crossville Nos.</u>								
1227	1.38	16.7	VE	S.Rus	Cream	Shallow		(S)
1308	1.69	17.7	ML					Sample lost (S)
1369	1.56	18.6	E	Rus.	White	Shallow	Oval	(S)
1699	1.50	16.0	M	Red	"	Deep	"	Rough (D)
1162	.50	20.7	ME	"	Cream	Shallow	Round	Pale red (D)
1164	1.27	17.9	M	"	"	"	Oval	Russet red (D)
1176	2.00	17.7	M	"	White	Medium	Round	Bright red-rough (D)
1182	1.11	15.5	VE	"	"	Deep	Oval	Bright red (D)
1184	1.89	18.2	M	"	"	Shallow	Round	Pale red (D)
1195	2.11	18.2	M	"	"	Medium	"	" " (S)
1201	1.63	16.7	M	"	"	Shallow	Oval	" " (D)
1203	1.22	16.5	ME	White	"	"	Round	Looks good (S)
1219	1.50	16.5	L	S.Rus	"	Medium	"	(D)
1225	1.67	16.3	M	"	"	Shallow	Oval	(D)
1241	1.56	18.2	ME	Rus.	Cream	Deep	"	Rough (D)
1250	2.13	14.7	ME	White	White	"	"	(D)
1252	1.14	15.1	E	S.Rus	Mixed	Shallow	"	Mixed seed (D)
1254	1.50	19.7	E	Rus.	White	Medium		All size B- (D)
1256	1.50	17.3	M	S.Rus	"	Shallow	Oval	(D)
1265	1.13	16.7	ME	"	"	"	Long	(D)
1295	1.20	17.9	E	White	Cream	"	Oval	(S)
1341	.88	17.1	E	S.Rus.	White	"	"	(D)
1697	1.30	13.7	M	Red	Pink	Medium	"	(D)
1711	1.25	14.5	ME	Brown	White	"	"	Netted skin (D)
2087	.67	15.5	VE	S.Rus.	Yellow	Shallow	"	(D)
1145	1.43	20.2	ME	Rus.	White	"	"	(S)

See footnotes under table 2.

TENNESSEE (CROSSVILLE)
T. R. Gilmore

In 1954, 18 seedlings and 3 named varieties obtained from the southern project of the National Potato-Breeding Program, and originally increased at Crossville, were planted in a yield plot. The potatoes suffered from drought and excessive high temperatures during the last half of the growing season. As a result the tubers were smaller than usual, but fairly satisfactory yields were obtained. Seedlings 4454 and 3769 looked especially promising in yield and tuber shape.

Tenn. table 1. 1954 potato yield test, Crossville, Tenn., 3 replications of 25 hills.

Variety or seedling	Parentage	Yield per acre	
		U.S. No. 1	U. S. No. 2
		Bu.	Bu.
4454	Ontario x B 355-44	230	16
3769	Kennebec x B 522-33	220	17
Kennebec		199	34
4720	B 607-72 x B 962-32	194	14
Pungo		189	21
3600	B 608-56 x B 594-46	183	56
4021	B 381-2 x B 56-1	180	19
3954	B 76-23 x 157-9	174	16
4064	B 607-37 x B 607-56	161	37
Cherokee		160	29
3953	B 76-23 x 157-9	159	14
2473	B 381-2 x 96-56	157	24
4426	B 76-43 x 96-56	156	26
2349	B 56-1 x B 76-23	148	34
4735	Kennebec x B 922-3	136	21
2827	Empire x B 61-3	134	18
4409	TI5 x B 355-24	131	11
4063	B 607-37 x B 607-56	124	20
4394	B 1153-10 x B 878-29	107	17
4731	B 779-16 x B 962-32	106	30
3266	TI5 x B 355-24	87	7

L.S.D. at 5% level

60.5

TEXAS (Prairie View)
J. M. Coruthers

In Coruthers table 1, 24 potato varieties or seedling varieties were tested for yielding ability and market ability.

The White Rose variety, the commercially important one in California, was 1 of the 3 top for yield of U.S. No. 1 tubers. Saco seemed best of the USDA sorts although Pontiac, Kennebec, Pungo, and Teton were as good when yields of marketable potatoes were compared. The Louisiana varieties, LaSoda and DeSoto, were not outstanding. The standard varieties for this area, Triumph, Irish Cobbler, and Katahdin, were far below a number of varieties in this test.

Testing these varieties 3 to 5 years should help us to decide which ones should be recommended for planting in this area.

Coruthers table 1. Average of blocks A B C D (30' rows, 38" apart- 600 lbs. 5-10-10 fertilizer per acre applied in bed).

Variety	Marketable potato variety yields per acre	
	U. S. No. 1	U. S. No. 2
	Bu.	Bu.
Triumph	122	45
Irish Cobbler	98	34
Katahdin	143	27
Houma	103	25
Green Mountain	106	38
Earlaine	141	38
Kennebec	220	13
Pontiac	238	30
Pungo	196	20
Red Warba	130	33
Teton	191	22
Menominee	125	18
Mohawk	142	11
White Rose	233	28
Early Gem	122	14
Marygold	142	31
Osage	70	6
B 355-35	147	29
Merrimack	105	30
Saco	180	38
NC880-4	160	12
LaSoda	147	14
DeSoto	145	14
Chippewa	109	37

TEXAS
Paul W. Leeper

In 1954, 33 varieties and seedlings were grown and evaluated at the Texas Agricultural Experiment Station. The experimental procedure and growing conditions were as follows:

Location: Weslaco, Texas

Soil: Willacy fine sandy loam

Previous Crop: Cantaloupe

Plot size: 25 feet x 38 inches

Plot design: Randomized block

Seed: Supplied by Dr. T. P. Dykstra, L.S.U., Baton Rouge, La.,
and Nebraska Certified Potato Growers, Alliance, Neb.

Planting date: January 8, 1954

Harvest Date: April 8, 1954

Fungicides: None

Insecticides: Toxaphene, DDT

Fertilizer: 80 pounds Nitrogen from 33% ammonium nitrate
80 pounds P_2O_5 from 45% superphosphate

Growing conditions were favorable throughout the season. Moisture was not a limiting factor as an ample supply of irrigation water was available throughout the season.

Results of this test are given in Texas table 1.

Texas table 1. Potato variety and seedling trials, Weslaco, Texas, spring 1954.

Variety or seedling	Mean yield U.S. #1 per acre					Stand count	Remarks
	1 7/8" & over	1 1/2"- 1 7/8"	Market- able	Culls	Total		
	Bu.	Bu.	Bu.	Bu.	Bu.	Pct.	
1354	171	27	198	15	213	97	Tough skin
4001	36	45	81	26	107	88	" " eliminate; red
2867	114	58	171	28	200	99	" " late; red
1393	139	21	160	6	167	95	" " red
3058	91	21	112	7	118	93	Light red; skinned
3546	152	65	217	38	255	99	Red; immature skin
3972	147	36	182	23	205	99	Red; tough skin
4379	120	16	135	4	139	96	Red; skinned
4399	176	45	220	16	237	97	Red; tough skin
4411	161	33	195	15	210	96	Red; skinned
4145	192	20	212	7	219	97	Red; tough skin
1396	191	32	223	15	237	100	Red; " "
4422	146	60	206	30	236	93	Red; " "
4739	94	91	185	37	221	96	Red; " "
4766	121	66	186	25	211	96	Red; " "
2778	36	24	61	15	75	73	Red; late; eliminate
4441	116	27	143	12	155	93	Light red; tough skin
1404	201	33	234	13	246	99	Red; immature
4458	155	25	181	11	192	99	Red; "
2766	99	53	152	28	180	100	Red; tough skin
3976	116	63	179	28	207	96	Light red
4393	101	38	138	9	148	100	Red; tough skin
4442	82	34	116	12	128	96	Red; " "
3655	194	47	241	16	257	100	Red; " "
Sheridan	340	11	351	3	354	99	Dark red; skin
Dazoc	307	20	327	5	332	100	Red; skinned
DeSoto	200	25	225	7	232	96	Red; tough skin
Kennebec	235	7	242	1	243	95	White; skinned
LaSoda	296	5	301	4	305	96	Light red; skinned
White Rose	201	32	233	6	238	99	White; tough skin
Red Warba	250	10	260	3	263	97	Red; rough; skinned
Triumph	229	11	240	5	244	99	Light red; skinned badly
Red Pontiac	304	12	315	4	319	97	Red; tough skin
L.S.D.	.05 15.1	4.8	15.4	3.0	14.2		
"	.01 20.0	6.4	20.4	4.0	18.9		

UTAH
DeVere R. McAlister

Twenty varieties of potato were tested for yield at the Greenville Experimental Farm, north of Logan, Utah.

A randomized block design with 3 replications was used. Each plot consisted of 3 rows 30 feet long and 3 feet apart. Seedpieces were planted 9 inches apart in the row.

Plots were planted May 16 on land broken from alfalfa and fertilized with 100 pounds of nitrogen per acre (500 pounds of ammonium sulphate). Planting was made in the dust and irrigated May 17 and at weekly intervals thereafter. The plots were harvested October 15 and 16. Yield data were taken on center row of each plot. The yield data are given in Utah table 1.

Utah table 1. Potato variety test at Logan, Utah, 1954.

Variety	Seed from:	Total yield per acre	Yield per A. mkt. tubers over 1 7/8"	Comments
		Bu.	Bu.	
1. Red Pontiac	Utah	678	619	Tendency to oversize
2. Early Gem (BP)	N. Dakota	654	607	Oversize & hollow heart.
3. Bliss Triumph	Utah	650	594	
4. Red Bliss Triumph	Minnesota	634	582	
5. Early Gem (AB)	N. Dakota	653	572	Oversize & hollow heart
6. White Rose	Utah	592	550	
7. Sheridan	Nebraska	586	543	
8. Katahdin	Colorado	597	539	
9. Redkote	N. Dakota	582	533	
10. DeSoto	Colorado	581	532	
11. Red Warba	Colorado	665	527	Poor appearance
12. Russet Burbank	Utah	603	526	
13. Kennebec	Utah	551	489	
14. Redburt	Minnesota	540	487	
15. Irish Cobbler	Utah	526	478	
16. Ontario	Wisconsin	525	474	
17. LaSoda	Wisconsin	555	468	
18. Osage	N. Dakota	472	421	
19. Dazoc	Nebraska	445	403	
20. Cherokee	Minnesota	393	346	High incidence of mosaic
21. Chippewa	Minnesota	307	278	Poor stands
	$\bar{X}$ =		506.6	
	F =		8.94**	
	L.S.D. .05		82.7	
	" .01		109.6	
	C.V.		12.97%	

VIRGINIA (Norfolk)

M. M. Parker, T. J. Nugent and R. N. Hofmaster

Scab-Resistant Varietal Trials

Thirteen varieties and two seedling lines of Irish potatoes were planted in 1954 on the same land in which the 1953 scab trials were made. Yields, scab resistance, and injury by flea beetles and wireworms were noted. Four replicates (50 seed pieces per replicate) were planted March 23 and harvested July 8, 1954. Approximately 50 potatoes from each replicate were graded for scab and a scab index - ranging from zero for no scab to 100 when all potatoes were severely scabbed - was determined. The methods used for measuring the degree of insect injury are listed in the footnotes of Parker table 2.

Results

Scab and Yield Records: The data (Parker table 1) on scab showed approximately the same results as for the previous year. Early Gem was completely free of scab, and Menominee, Ontario, and Cherokee were highly resistant with more than 90% of the A size potatoes being marketable. The two seedling lines 3159 - 1 and 2368-13 were also highly resistant to scab. Pungo, Sebago, and Pontiac were partially resistant with 60 or more percent of the A size potatoes marketable. Chippewa, Canso, White Cloud, Cobbler, Katahdin, and Kennebec were susceptible to scab with less than 50% marketable potatoes.

Variety Yields

The planting made for the scab trials was also used to figure variety yields by using yields of A size potatoes regardless of whether or not they were infected with scab.

The potatoes in all the test plots were planted following the usual commercial method of plowing under a crop of winter rye just before planting, and fertilizing with 2,000 pounds of a 5-10-5 mixture placed in bands on each side of the seed piece at the time of planting. The seed was spaced 1 foot apart in rows 3 feet apart.

Dry weather during the growing season caused low yields all over eastern Virginia in 1954, but the experimental plots were planted in a soil that held moisture well so that fairly good yields were obtained except where home-grown seed was used.

Parker table 3 shows the order of yield of the different varieties. Cherokee gave significantly larger yields than any of the others and even better than Pontiac or Pungo which in the past have been among the leaders in producing large yields. Pontiac was second in productivity in 1954 but Pungo was several places lower. However, commercial plantings of Pungo gave excellent yields in 1954 and there is general satisfaction with this variety with increased demands for seed. Katahdin was the lowest yielding variety omitting those kinds that were grown from home-grown seed.

Insect Preference Tests

Insect Injury: Due to the adverse effects of the dry weather, readings were made on the flea beetle injury to the foliage about 3 weeks earlier than in 1953. At the time the readings were made, emergence of the spring brood of flea beetles was just well underway. Menominee had the least number of leaf punctures and Ontario was next. (Parker table 2). These two varieties were also the least injured in this respect the previous year. White Cloud and Pontiac had the most foliage injury from the flea beetles.

Flea beetle damage to tubers was approximately three times that which occurred in 1953. All varieties except Menominee and Ontario had numerous raised, nipple-like projections on the tubers as a result of the feeding of the flea beetle larvae. The seedling line 3159-1 and Early Gem were especially affected in this respect.

No significance could be placed in the injury caused to the tubers by wireworms.

Parker table 1. Scab index and total and marketable yields of A size potatoes

Variety or seedling	Scab index	Total yield per A ₁ A size marketable	
		100-lb bags	100-lb. bags
<u>Resistant to Scab</u>			
Early Gem ¹ / ₁	0.0	54	54
Menominee ¹ / ₁	.7	88	88
Ontario ¹ / ₁	1.6	109	108
B 3159-1 ¹ / ₁	2.1	37	35
B 2368-13 ¹ / ₁	13.6	74	69
Cherokee	16.8	154	139
<u>Partially Resistant to Scab</u>			
Pungo	19.9	96	83
Sebago	32.6	94	68
Pontiac	36.9	122	82

Parker table 1 continued

Variety or seedling	Scab index	Total yield per A.	A size marketable
		100-lb bags	100-lb bags
<u>Susceptible to Scab</u>			
Chippewa	46.1	118	55
Canso	46.7	102	52
White Cloud	48.8	95	43
Cobbler	52.8	117	40
Katahdin	53.6	70	27
Kennebec	58.5	114	34
L.S.D. at 5% level	11.5	21	30

1/ Home-grown seed.

Parker table 2. Irish potato varietal resistance to flea beetles and wireworms.

Variety	Flea beetle punctures or scars		Wireworm tunnels or scars <u>3/</u>
	Foliage <u>1/</u>	Tubers <u>2/</u>	
Canso	306	48.8	8.5
Cherokee	304	66.8	8.5
Chippewa	340	67.3	10.3
Cobbler	458	89.8	9.0
Katahdin	252	44.3	10.5
Kennebec	226	59.0	12.5
Menominee	74	47.3	8.8
Ontario	159	50.5	6.8
Pontiac	473	94.8	7.8
Pungo	263	73.5	8.3
Sebago	201	63.8	7.8
White Cloud	485	50.0	8.8
Early Gem	324	100.8	13.3
B 2368-13	253	75.8	7.3
B 3159-1	Not sampled	142.5	7.8
L.S.D. at 5% level	71	40.7	Not significant

1/ Average flea beetle punctures per 25 (0.5 square inch leaf samples) per replication. Five plants sampled per replication. Two lower leaves, two middle leaves, and top leaf selected at random from each plot. Sampled June 7, 1954.

2/ Twenty tubers selected from each replication and all flea beetle punctures counted in a 1-square-inch area on each tuber. Sampled July 8, 1954.

3/ Ten tubers selected from each replication and all wireworm punctures or scars counted. Sampled July 8, 1954.

Parker table 3. Variety yields in 100-pound sacks of A size potatoes per acre.

<u>Variety</u>	<u>Yield per acre</u> <u>100-lb. sacks</u>
Cherokee	154
Pontiac	122
Chippewa	118
Cobbler	117
Kennebec	114
Ontario ^{1/}	109
Canso	102
Pungo	96
White Cloud	95
Sebago	94
Menominee ^{1/}	88
B 2368-13 ^{1/}	74
Katahdin	70
Early Gem ^{1/}	54
B 3159 ^{1/}	37
L.S.D. at 5% level	21

^{1/} Homegrown seed.

VIRGINIA (Eastern Shore)

G. R. Williams, A. V. Watts, R. U. Nottingham and P. H. Massey, Jr.

Twelve potato varieties were grown and evaluated in Northampton County in 1954. The experimental procedure and growing conditions were as follows:

Location: Eastville, Va.

Soil: Sassafrass Sandy Loam

Previous Crop: Potatoes (1953), followed by grass (turned),
by oats (turned).

Plot Size: 30 x 3 feet (data taken on center 28 feet of each
record row).

Plot Design: Randomized block.

Replications: 4.

Seed: Supplied by Virginia Truck Experiment Station and Virginia
Agricultural Experiment Station. Cut seed approximately $1\frac{1}{2}$ oz. .

Spacing: 12 inches.

Fertilization: 2,000 pounds of 5-10-5 per acre applied in bands on
each side of seed.

Planting date: February 24.

Cultivation: Frequently enough to control weeds.

Insecticide: DDT, applied twice to control the Colorado potato
beetle.

Growing conditions: Generally unfavorable because of extremely
hot, dry weather during June and July.

Harvest date: July 14.

The dry weather reduced the yield of all varieties in this trial. A reduction was also noted in the size of potatoes and in the number of tubers per hill.

Sequoia, Kennebec, and Pungo varieties were superior, in general appearance, to the other varieties tested. Pontiac and Sequoia yielded significantly more U. S. No. 1 potatoes than Irish Cobbler, the standard variety grown in this area. Kennebec was significantly higher in percentage solids than any other variety tested.

Adverse weather conditions were experienced again this year, but Sequoia, Kennebec, and Pungo performed well in relation to the other varieties included in this trial.

Va. table 1. Yield per acre, specific gravity, and dry matter of 12 varieties of potato tested in 1954.

Variety or seedling	Mean yield per acre			Total ^{2/} solids
	U.S. No.1	U.S. No.2	Total	
	Bu.	Bu.	Bu.	Pct.
Pontiac	168	51	241	18.2
Sequoia	160	43	224	20.2
Kennebec	135	57	205	22.2
Pungo	134	69	227	19.9
White Rose	130	74	222	20.4
Teton	128	61	206	19.7
Cherokee	127	52	197	20.8
Houma	110	57	188	19.4
Mohawk	106	48	175	21.2
Irish Cobbler	99	59	172	19.4
Early Gem ^{1/}	85	24	123	16.9
Chippewa	84	31	137	18.9
L.S.D. .05	49	16	49	.8
.01	69	22	70	1.2

1/ Planted March 18 because tubers not available when other varieties were planted.

2/ Total solids obtained from specific gravity determinations on 4 replications of 25 tubers each.

WASHINGTON
S. B. Locke^{1/}

Potato variety plants similar to those of previous years were established at 3 locations for the purpose of determining leaf roll infection during the 1954 season. Sixteen varieties and seedlings were included.

Tuber samples obtained from the 1953 variety plots were indexed during the following winter and spring to determine virus content. The average leaf roll field spread for 1953 was only slightly greater than in 1952. Unusual is the lower rate for Prosser (28.1%) than for Mt. Vernon (46.6%) and Pullman (58.7%). The greatest average spread occurred in the variety Russet Burbank, followed closely by Seedling 45.3-6, Redkote, and Pungo (See Wash. table 1). Seedling B 579-3 remained free from leaf roll at Prosser and Mt. Vernon but showed 26.3% infection at Pullman. Nevertheless, the average leaf roll infection in this seedling for all three locations was less than for any other seedling or variety. Seedling W. P. 94, Katahdin, Seedling W. P. 31, and Seedling W. P. 57 were next in order of increasing infection. These seedlings were selected by Dr. J. D. Menzies at Prosser and survived several seasons of exposure to leaf roll infection under field conditions there before being introduced in this trial.

Wash. table 1. Percentage leaf roll increase in potato varieties exposed during 1953.

Variety	Pullman	Prosser	Mt. Vernon	Average	Maximum
	Pct.	Pct.	Pct.	Pct.	Pct.
B 579-3	26.3	0.0	0.0	8.8	26.3
W. P 94	12.6	1.9	40.7	13.8	40.7
Katahdin	17.0	15.3	14.2	15.5	17.0
W. P. 31	3.9	21.3	24.4	16.5	24.4
W. P. 57	3.9	3.4	52.1	17.8	52.1
Progress	38.9	29.4	15.5	27.9	38.9
B 137-5	42.3	6.3	35.1	27.9	42.3
Early Gem	44.9	18.4	56.8	40.0	44.9
L. D. 22	92.9	2.1	27.4	40.8	92.9
Yampa	76.7	6.5	46.6	43.3	76.7
La Mex	85.4	9.7	39.3	44.8	85.4
C. S. 10212	51.8	29.7	58.0	46.5	58.0
Cherokee	84.1	7.5	52.3	48.0	84.1
White Cloud	66.9	33.7	52.5	50.6	66.9
Canso	70.2	29.8	54.9	51.6	70.2

^{1/} The field testing work was done in cooperation with Dr. C. S. Vincent, Department of Horticulture, W. S. C.

Wash. table 1 continued

Variety	Pullman	Prosser	Mt. Vernon	Average	Maximum
	Pct.	Pct.	Pct.	Pct.	Pct.
ND 457	46.7	58.2	54.4	53.1	58.2
Keswick	82.0	45.9	54.2	61.7	82.0
C.S. 10220	88.1	46.7	61.8	65.5	88.1
Pungo	90.8	52.8	78.2	73.9	90.8
Redkote	85.1	80.8	56.3	74.1	85.1
45.3-6	96.6	40.0	87.2	74.6	96.6
Russet Burbank	83.4	78.2	63.1	74.9	83.4
Location averages	58.7	28.1	46.6		

Observations were made on the incidence and severity of phloem necrosis in the 1953 samples at the time of planting for indexing of virus content. Two-hundred tubers of each variety were cut and examined. The tubers were classified into five categories with respect to the distance of penetration of the injury from the stem-end. From these data an index of severity was calculated. Phloem necrosis was found in 8 of 21 varieties examined (See Wash. table 2). Incidence varied from 2.6% to 87.6% of the tubers being affected. The index of severity ranged from 0.25 to 0.50 and correlated somewhat with incidence. However, there were exceptions such as Yampa which showed only 2.6% incidence but had a severity index of 0.50.

Data were obtained also on incidence and severity of Rhizoctonia injury on potato varieties under greenhouse conditions very favorable to attack. These appear in Wash. table 3. Incidence varied from 20.1% to 89.6% and severity indexes ranging from 0.13 to 0.69 were obtained. Here, again, there appears to be some correlation between incidence and severity of injury.

Washington table 2. Phloem necrosis in potato varieties exposed during 1953 at Prosser and Mt. Vernon, Wash.

Variety	Current-season leafroll infection	Phloem necrosis	Leafroll infected tubers showing phloem necrosis	Phloem necrosis severity index $\frac{1}{2}$ (0-1)
	Pct.	Pct.	Pct	
B 579-3	0.0	0.0		
Katahdin	14.6	.0		
B 137-5	20.7	.0		
W. P. 94	21.3	.0		
Progress	22.5	.0		
W. P 31	22.9	.0		
La Mex	24.5	.0		
Yampa	26.6	.7	2.6	0.50
W. P. 57	27.8	.0		
Cherokee	29.9	.0		
Early Gem	37.6	1.9	5.1	.33
Canso	42.4	.0		
White Cloud	43.1	11.4	26.5	.48
C. S. 10212	43.9	.5	1.1	.25
Keswick	50.5	1.7	3.4	.25
C. S. 10220	54.3	.0		
ND 457	56.3	3.2	56.8	.45
45.3-6	63.6	.0		
Pungo	65.5	57.4	87.6	.50
Redkote	68.6	.0		
Russet Burbank	70.7	11.3	16.0	.41

$\frac{1}{2}$ Based on extent of phloem necrosis in the tubers. An index of one indicates phloem necrosis throughout the length of all of the tubers affected.

Washington table 3. Incidence and severity of *Rhizoctonia* stem infection in potato varieties grown in the greenhouse during the winter of 1953-54.

Variety	Stems examined	Stems infected	Severity index $\frac{1}{(0-1)}$
	No.	Pct	
W. P. 94	693	20.1	0.13
B 137-5	399	35.3	.26
Early Gem	369	37.4	.18
ND 457	399	38.6	.37
Triumf	934	39.8	.22
B 579-3	351	40.5	.19
CS 10212	499	40.9	.20
Canso	325	42.8	.24
W. P. 57	519	45.1	.29
C. S. 10220	339	45.7	.27
La Mex	675	47.7	.25
Katahdin	591	52.3	.29
Cherokee	494	56.4	.34
White Cloud	363	57.3	.39
Redkote	594	64.0	.22
Yampa	404	68.3	.40
Keswick	297	68.4	.39
W. P. 31	566	70.5	.27
Pungo	574	71.6	.48
Progress	573	73.3	.43
P.45.3-6	422	76.1	.58
Russet Burbank	444	79.1	.62
L.D. 22	520	89.6	.69

1/ An index of one indicates all of the stems severely affected

WASHINGTON (Pullman)
C. L. Vincent

Since 1948 the potato variety trials have been planted each year in three locations in the State of Washington; namely, Pullman (non-irrigated), Prosser (irrigated), and Mount Vernon (non-irrigated). The same plot and planting design were used at each place and the varieties planted were all from the same sources and had been handled alike up to planting.

Growing conditions were very favorable at each location in 1954 until the plantings at Mount Vernon were hit by late blight in late August causing death of most of the plants of all varieties. The yield at that place would have been somewhat larger except for this condition. The number of tubers per hill were not reduced but the tuber size was somewhat smaller than expected. Even so the yields from this planting were very satisfactory.

All varieties were replicated four times and each replicate consisted of 25 hills spaced 1 foot apart in the row and 3 feet between rows. Every fourth row in each planting was planted to Russet Burbank heavily infected with leaf roll. Fertilizer applications were alike for each planting although soil types differed.

An examination of the data shows Pontiac to be the heaviest yielding variety in the plantings. It leads not only in total yield but in potatoes over 1 7/8 inches in diameter as well. Its yielding ability in all areas makes it a contender for space in the farm gardens of Washington if not in commercial plantings. It compares favorably with Essex, a variety planted previously, in over-all State yields but has better cooking qualities than Essex based on specific gravity readings. (Wash. tables 1 and 2)

Other high yielding varieties, considering State-wide yields, are Katahdin, Keswick, Manota, Progress, Pungo and Redkote. Redkote, however, is a little too small at maturity unless water is available during the growing season. Russet Burbank is a high yielding variety but culls out heavily because it is a long rather than a round shaped potato. It is a fact that a high percentage of the No. 2 and cull Russet Burbank are much more desirable from a culinary standpoint than the smaller round potatoes just meeting the 1 7/8 inch minimum. Osage was a good yielding, long, medium-shallow eyed potato with some promise. Osseo yielded very well for an early maturing potato. It is a white-fleshed, round, bronze-colored tuber with many medium-shallow eyes. It looks promising for an early potato even though it has no scab or blight resistance.

Seventeen lots of scab-resistant potato selections were planted at the Irrigation Experiment Station at Prosser in 1954. Of this number (see Washington table 3), C.S. 11751, C.S. 11875, C.S. 12360, and B 2368-4 appear to have considerable promise.

Wash. table 1. Yield of potatoes from 4 replicates grown in 3 locations in Washington in 1954.

Variety	Potato yields per acre						Ave. yield per	
	Prosser		Mt. Vernon		Pullman		A. of varieties	
	Total	Tubers over 1 7/8" dia.	Total	Tubers over 1 7/8" dia.	Total	Tubers over 1 7/8" dia.	grown at several locations.	
	Ton	Ton	Ton	Ton	Ton	Ton	Total	Over 1 7/8"
B 579-3	13.5	12.7	12.0	10.9	11.2	9.9	12.2	11.2
Canso	21.4	20.0	17.9	16.3	17.1	15.5	18.8	17.3
Dazoc	19.3	17.8	21.1	18.5	15.4	12.0	18.6	16.1
Katahdin	26.4	25.2	17.5	16.1	19.1	17.6	21.0	19.6
Keswick	24.4	23.3	20.1	19.3	18.0	15.5	20.8	19.4
Manota	24.4	22.9	16.9	15.8	20.2	19.0	20.5	19.2
Osage	18.5	17.7	18.3	17.7	15.4	14.3	17.4	16.6
Osseo	17.1	15.9	12.3	11.8	15.3	14.7	14.9	14.1
Pontiac	38.5	35.4	24.8	23.3	22.4	21.2	28.6	26.6
Progress	23.1	20.9	18.1	15.5	17.8	16.0	19.7	17.5
Pungo	24.1	23.3	22.9	20.6	18.0	16.2	21.7	20.0
Redkote	22.7	21.0	21.0	17.7	16.3	13.8	20.0	17.5
Russet Burbank	27.5	23.5	18.3	11.7	18.0	12.7	21.3	16.0
Sheridan	20.9	18.5	19.1	17.1	14.8	12.3	18.3	16.0
White Cloud	18.1	17.1	14.9	12.1	16.2	14.4	16.4	14.5
Wireworm								
Resistant	16.6	15.7	14.7	13.9	16.7	15.8	16.0	15.1

Wash. table 2. Dry matter content of some potato varieties grown at three locations based on specific gravity.

Variety.	Places in Washington where grown.		
	Pullman	Prosser	Mt. Vernon
	Dry matter	Dry matter	Dry matter
	Pct.	Pct.	Pct.
B 579-3	23.7	23.9	20.6
B 2368-4	-	21.9	-
Canso	25.8	20.6	20.6
Dazoc	21.6	20.9	19.4
Katahdin	23.9	23.7	18.2
Keswick	23.4	21.6	20.6
Manota	22.7	22.1	18.6
Osage	22.1	21.6	18.9
Osseo	21.1	18.4	17.7
Pontiac	22.7	21.9	18.4
Progress	21.6	21.1	17.6
Pungo	24.7	22.1	19.9
Redkote	22.1	22.1	20.6
Russet Burbank	22.1	22.7	20.9
Sheridan	23.4	22.7	18.2
White Cloud	22.4	22.9	19.1
Wireworm Res.	23.9	22.1	16.5

Wash. table 3. Scab resistant potato trials^{1/}. 1954

Variety	Total tubers from 10 hills	Number and percentage of tubers showing scab ^{2/}							
		No scab		Light scab		Medium scab		Heavy scab	
		No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
1. C.S. 10185	30	4	13	5	17	11	37	10	33
2. C.S. 11726	86	0	0	5	6	12	14	69	80
3. C.S. 11737	35	0	0	1	3	7	20	27	77
4. C.S. 11751	123	4	3	22	18	42	34	55	45
5. C.S. 11863	55	0	0	7	13	21	38	27	49
6. C.S. 11875	71	1	1	32	45	26	37	12	17
7. C.S. 11888	69	0	0	7	10	20	29	42	61
8. C.S. 11889	26	0	0	2	8	8	31	16	61
9. C.S. 11969	71	0	0	7	10	39	55	25	35
10. C.S. 11976	92	0	0	2	2	10	11	80	87
11. C.S. 12132	57	0	0	4	7	18	31	35	61
12. C.S. 12203	89	0	0	4	4	15	17	70	79
13. C.S. 12240	34	0	0	4	12	7	20	23	68
14. C.S. 12288	90	0	0	2	2	4	4	84	93
15. C.S. 12360	104	0	0	22	21	41	39	41	39
16. C.S. 12441	28	0	0	0	0	1	3	27	96
17. ^{3/} B 2368-4 Lot 1	61	0	0	4	6	16	26	41	67
Lot 2	62	0	0	11	18	23	37	28	45

^{1/} Tubers 1 to 16, inclusive, furnished by W. C. Edmundson, Sr. Horticulturist, U.S.D.A., Box 747, Greeley, Colo. Planted on scab-infested soil at Prosser, Wash.

^{2/} Scab rating scale:

No scab; Surface* of tubers free from any evidence of scab infection

Light scab; Not over 10% of surface of tubers covered with scab.

Medium scab; 10-25% of surface of tubers covered with scab.

Heavy scab; Over 25% of surface of tubers covered with scab.

^{3/} Supplied by Dr. John G. McLean, Horticulturist U.S.D.A., Aberdeen, Idaho. Planted at Prosser

WEST VIRGINIA
M. E. Gallegly

The 1954 potato work by the Department of Plant Pathology has been concerned with races of Phytophthora infestans and resistance to them.

Potato Races of P. infestans

Since the last report, International potato races 1,2,3, and 1,2,3,4 have been identified in cultures received from Canada. This brings to 15 the number of races now recorded. Out of the possible 16 races identifiable with the 4 known genes, only race 2,3 remains to be found. Potato races 3 and 3,4 were identified in isolates collected in 1951 from tomato plants growing in West Virginia and Florida. Race 1,2,4 was isolated in 1954 from Beltsville hybrids growing at Huttonsville, W. Va. The collection of potato races at this station now totals 14; only races 1, 3 and 2,3 of the possible 16 are missing.

In the field in 1954, late blight was moderate to severe late in the season. The common or potato race 0 apparently was absent from the Huttonsville area. When late blight moved in, both Cobbler and Kennebec varieties growing in commercial fields were infected simultaneously. A number of different isolates of the fungus, taken from both varieties, all proved to be race 1,4 when identified in the greenhouse on a set of differential hosts. In the experimental plots, selections bearing the R_2 resistance gene remained free from the disease until September when race 1,2,4 appeared.

Differential Hosts

At present, 4 dominant genes (R_1 , R_2 , R_3 , and R_4) for resistance to potato races of P. infestans are recognized. With these, it is possible to have 16 differential hosts if the genes occur singly and in all possible combinations in different clones. Hosts used by W. Black in Scotland, C. Mastenbroek in the Netherlands, and W. R. Mills and L. C. Peterson in the United States for race identification have been brought together, maintained free of visible virus symptoms, and built up in quantity for use and redistribution. Not all of the 16 possible genotypes are present in the collection; those now being used as differential hosts at this station, with their genotype and source, are as follows:

Cobbler	r	--
Essex	R_1	Mills and Peterson
3RC-8	R_2	Mills and Peterson
Pentland Ace or 1253a(12)	R_3	Black
DXD-3	R_4	Mills and Peterson
3XE-1	R_1R_2	Mills and Peterson
4739-58	R_1R_3	Mastenbroek

3WM-19	R ₁ R ₄	Mills and Peterson
1682c(1)	R ₂ R ₃	Black
TI-5	R ₂ R ₄	Mills and Peterson
1488b(1)	R ₃ R ₄	Black
3XX-1	R ₁ R ₂ R ₄	Mills and Peterson

All of the possible combinations of 3 genes and the combination of all 4 are not available at present. In order to complete the set of 16 hosts, crosses involving all 4 genes have been made for us by Stevenson and Buck at Beltsville. Selections from these crosses should complete the set.

For race identification, only the first five hosts (recessive and single-gene hosts) are necessary in the majority of cases. All are helpful when race mixtures occur. If mixtures are suspected, sub-cultures from each of the susceptible single-gene hosts may be used to reinoculate these five hosts to separate and complete identification of the original isolate. This method of identification will work only when the isolate is of a pure culture of one race or when the components of a mixture are of comparable host range level or involve different resistance genes, i.e., races 1 and 2; 1, 2 and 1, 3; 1 and 2, 3; 3 and 1,2,4; and 2,3,4; etc. In these cases, a retest with sub-cultures from each of the susceptible single-gene hosts would separate the mixtures into their component parts. However, if the components of a mixture were of different host range levels with one of the hosts susceptible to both, i.e., 1 and 1,4; 1 and 1,2,4; etc., then they could not be completely separated by host passage. The race with the higher host range level could be freed from that with the lower; for instance, race 1, 4 could be obtained free from race 1 by isolating from the R₄ genotype since this host is resistant to race 1. However, the race with the lower host range level may not be obtained free from that with the higher by host passage; in the above example, isolations from the R₁ genotype may yield both races 1 and 1,4 since this host is susceptible to both. It may be necessary to make single zoospores cultures from such mixtures to obtain the component parts in a pure state.

In the past, late blight workers have used as many of the differential hosts as were available to them at the time. One inoculation of the complete set would identify and varify the race characteristic of an isolate; if the isolate happened to be a mixture of 2 or more races, reaction of the complete set of hosts would give some idea which races were present in the mixture. As long as there are only 4 major genes for resistance, it will not be too difficult to maintain the 16 hosts of different gene combinations.

With the immediate possibility of having clones with 2 or more additional major genes, we at West Virginia, are turning to the idea of using only the single-gene hosts for race identification. As more genes are found, the number of possible gene combinations will increase geometrically. With the present 4 genes, 16 different combinations are possible; with a total of 6 genes, 36 genotypes may be developed; with 8 genes, 64 would be possible, etc. If this situation develops, it will be much easier to use the single-

gene hosts and make 2 separate inoculations as outlined above than to maintain and have available a large number of hosts with all the different gene combinations.

Resistance to P. infestans

Physiologic potato races 1,2,3; 1,2,4; 1,3,4; 2,3,4; and 1,2,3,4 have been used in a mass screening program to determine the genotype of various Solanum species maintained by the Interregional Potato Introduction Station at Sturgeon Bay, Wis. The screening is being done cooperatively with W. Black of the Scottish Plant Breeding Station. In addition, a number of F₁ hybrid clones from crosses of 6N S. demissum accessions with different 2N Solanum species were included in the West Virginia tests. The hybrid clones were supplied by R. W. Hougas, Sturgeon Bay, Wis. If an accession or clone carries only 1 or more of the 4 known genes, its genotype can be determined by examining its reaction to the first 4 races. Clones bearing only these genes would be susceptible to race 1,2,3,4. If new or different genes were present, then a clone would be resistant to all 5 races.

Results from such screening revealed that many of the S. demissum accessions are homozygous for resistance to race 1,2,3,4 and that this resistance is carried over to the F₁ clones. A few of the accessions and hybrids which were resistant to race 1,2,3,4 were susceptible to race 1,3,4; this indicates that the particular isolate used has a wider host range than indicated (race 1,3,4,5, for instance). Thus, at least two new and different dominant genes are present in certain accessions of Solanum demissum.

The five races listed above also have been used to determine the genotype of single-hill selections from family lines segregating for late blight resistance. This information has been recorded in K. C. Westover's (West Virginia) tables 1, 2, and 3.

WEST VIRGINIA
K. C. Westover and Mason E. Marvel

The testing and selecting for such desirable horticultural characteristics as appearance, yield, total solids, etc. were carried on, as in the past, at the Reedsville Experiment Farm by the Department of Horticulture. Breeding and testing for disease resistance were done at Huttonsville, W. Va., and in Morgantown at the pathological greenhouses by the Department of Plant Pathology. Insofar as possible without interruption of the breeding program, only those seedstocks known to be resistant to late blight have been maintained. In this respect added effort has been taken to determine the genetic background for this resistance.

Growing conditions in the immediate area were normal during the early development of the crop but the mid-summer was extremely dry and the late season excessively wet. These conditions, conducive to the development of off-shaped tubers, afforded opportunity to eliminate severely affected selections which hitherto had been considered desirable. At the Reedsville Farm the plantings were on deep, well-drained, shaley or silty loam (Clymer) soil in good tilth. A heavy clover sod was turned under just before and 5-10-10 commercial fertilizer at the rate of 600 lbs. per acre was applied bandwise at planting time. The plantings were killed on September 17 and harvest began about 2 weeks later. Specific gravity determinations from the row plantings were derived from two 10-tuber samples collected behind the digger. A single sample from each of the 10-hill units served for this purpose.

Family Line Planting. About 3,200 tubers from 21 family lines from Iowa and Beltsville, Md., were planted by machine at 40-inch intervals. One hundred seventeen selections were retained for next season's 10-hill unit planting. In addition, 68 families having relatively small populations were planted in the pathology greenhouse and screened for the different races of late blight and then set in the field at Huttonsville, W. Va. Hill selections from these will be planted again in 1955 to be further studied for adaptation and horticultural characteristics.

10-Hill Unit Plantings. From the 252 seedling units planted 26 selections were retained. The majority of these were screened again for late blight during the winter. W. Va. table 1 summarizes the data taken. In this planting check units of certified Cobbler and Sebago appeared alternatively every third unit in the row and were staggered in the planting so that each seedling unit was flanked by at least one of the check units and was not more than a row removed from the other.

W. Va. table 1. Yields, total solids, and disease resistance information of W. Va. selections from 10-hill unit plantings, Reedsville Experiment Farm, 1954.

Variety	Parentage	U.S. No.1 per acre	Off-Grade	Total solids	Resistant to:
		Bu.	Pct.	Pct.	<u>1/</u>
I. Cobbler	Av. of 64 checks	182	4.1	20.1	
Sebago	" " 63 "	209	3.4	18.3	
I 933-5	B 607-72 x M113.43	326	2.3	20.9	LB ¹
I 913-1	B 76-23 x B 67-11	317	1.5	20.9	LB ¹
B 3479-9	Ac 25928 x Katahdin	295	6.6	18.8	
B 3413-1	Kennebec x B 929-32	293	6.1	20.1	LB ¹
I 933-3	-----	288	6.5	18.1	LB ¹
B 3409-4	Kennebec x Katahdin	287	5.1	18.8	LB ¹
B 3472-15	Earlaine x B 929-32	276	10.0	17.8	
B 3472-42	"	272	3.3	17.0	
B 3472-33	"	256	5.9	18.9	
B 3472-2	"	251	7.5	17.1	LB ¹
B 3413-2	Kennebec x B 929-32	245	2.7	20.6	LB ¹
B 3475-7	Houma x Menominee	243	6.4	20.8	
B 3472-30	Earlaine x B 929-32	237	12.0	19.6	
I 933-4	----	233	6.2	19.0	S-LB ¹
B 3472-9	Earlaine x B 929-32	231	5.3	20.5	LB ¹
B 3472-24	"	230	6.1	19.8	
B 3472-41	"	219	1.5	19.5	
I 870-5	B 607-72 x 6316	210	3.8	19.6	LB ¹
B 3472-16	Earlaine x B 929-32	208	3.6	19.7	LB ¹
I 867-4	B 96-56 x B 67-11	206	3.6	18.3	
I 933-1	----	198	4.7	19.9	LB ¹
B 3472-1	Earlaine x B 929-32	189	10.5	19.1	
B. 3423-2	528-170 x Earlaine	182	6.9	20.7	
B 3472-11	Earlaine x B 929-32	179	7.5	18.0	LB ¹
B 3472-22	"	177	11.6	19.5	LB ¹
B 3472-12	"	173	3.8	19.8	LB ¹

1/ LB¹ signifies presence of R₁ gene for resistance to late blight.

S = Scab; LB = Late blight.

50-Foot Row Plantings. This planting comprised a single 50-foot row of each of 38 seedstocks of which 36 were seedling selections originating from Beltsville and Iowa family lines. The remaining 2 were named varieties. Check rows of certified Cobbler and Sebago alternated every third row so that each seedstock on trial was flanked by one of the check varieties and was only a row removed from the other. Information concerning the varieties and 13 seedlings to be tested further is summarized in W. Va. table 2.

W. Va. table 2. Yields, total solids and disease resistance information of selections from 50-foot-row plantings, Reedsville Experiment Farm, 1954.

Variety	Parentage	U.S. #1	Off-grade	Total	Resistant to:
		per acre		solids	
		Bu.	Pct.	Pct.	<u>1/</u>
Sebago	Av. 11 checks	709	4.8	19.5	
I. Cobbler	" 10 "	407	6.8	20.1	
Snowdrift	-----	711	2.7	20.4	LB ¹
I 933-4 W. Va.	B 607-72 x M113.43	690	3.9	18.8	S-LB ¹
I 1058-2 W. Va.	B 962-32 x B 762-46	689	4.4	18.6	LB ¹ -RR
Early Gem	Russet Burbank x 96-56	644	2.5	18.8	
B 605-10	Pungo x B 96-56	602	3.5	20.1	S-LB ¹
I 1089-2 W.Va.	B 6316 x Teton	581	3.2	18.2	LB ¹ -RR
B 3320-24 W.Va.	B 922-3 x Menominee	535	5.3	20.6	S-LB ² -VW
I 1073-3 W. Va.	B 2087-IA5 x B 962-32	452	3.5	21.5	S-RR
I 1092-1 W. Va.	Teton x B 962-32	425	3.3	21.7	LB ¹ -RR
I 1065-3 W. Va.	B 1276-185 x B 962-9	414	10.8	22.4	LB ¹ -LR
I 1092-3 W. Va.	-----	398	20.1	23.6	S-LB ¹
I 1114-1 W. Va.	B 776-2 x B 962-32	397	13.2	18.5	S-LB ¹ -X
I 1055-2 W. Va.	B 962-9 x M113.43	390	11.6	-----	S-LB ¹
I 1082-2 W. Va.	N225.43 x B 61-3	385	19.0	20.9	S-LB
B 3320-14 W. Va.	B 922-3 x Menominee	353	15.0	21.0	LB ²

1/ LB¹ signifies presence of R₁ gene and LB² signifies presence of R₂ gene for late blight resistance.

S = scab; RR = ring rot; VW = verticillium wilt; X = X virus; LR = leaf roll

Replicated Planting. This planting contained 11 promising seedling selections which have survived numerous preliminary trials and 13 named varieties, some of established value here and others, more recently named, reputed to have promise under local conditions. It consisted of 4 replications of 50-foot, single-row plot of each of the seedstocks in an incomplete block (lattice) arrangement. W. Va. table 3 summarizes the data from this planting.

The 10-hill-rows were planted 36 inches apart, the hills 20 inches apart. The 50-foot rows and replicated tests reported in tables 2 and 3 were planted at the standard distances for potatoes in this area 36 inches between rows

and 10 inches between plants. The percentages off-grade as shown in the tables are based on total yields. There was no irrigation but plenty of water late in the growing season.

W. Va. table 3. Yields, total solids, and disease resistance information from replicated trials, Reedsville Experiment Farm, 1954.

Variety	Parentage	U.S. #1	Off-grade	Total	Resistant to:
		per acre		solids	
		Bu.	Pct.	Pct.	<u>1/</u>
Pontiac		719	3.9	20.5	
B 69-16	Katahdin x 96-56	652	4.3	19.7	LB ¹
Kennebec	B 127 x B 96-56	610	5.5	20.3	LB ¹
Chenango	CUL-2	606	6.1	18.4	LB ¹
Houma	---	604	6.3	19.6	
Sebago, N.Y. cert.	----	600	6.8	18.2	
Sebago	--	600	7.4	19.2	
B 2070-30 W.Va.	Chippewa x B 594-46	589	16.1	20.1	LB ¹ -S
B 922-3	TI5 x B 355-24	588	4.4	17.5	LB ²
B 2911-32	B 446-54 x Teton	579	5.1	19.5	LB ¹
I 8168-1	6316 x B 766-88	576	4.3	20.1	
B 915-2	B 7623 x M113.43-1	567	3.0	19.7	LB ¹
Essex	---	561	5.3	20.5	LB ¹
Katahdin	---	556	4.3	20.0	
I 916-6 W.Va.	B 76-23 x N117.43-3	551	10.6	21.4	LB ¹
Canso		542	5.5	20.4	LB ¹
Ashworth		521	5.8	19.6	LB ¹
B 313-21	Sequoia x B 96-56	504	2.5	20.1	LB ¹
I 977-1 W.Va.	1712 x B 67-11	498	8.7	20.0	LB ¹ -S
B 2858-5 "	B 381-2 x Katahdin	490	6.9	20.9	LB ¹ -VA
I 933-3 "	B 607-72 x M113.43	481	8.6	20.4	LB ¹
I. Cobbler	----	456	9.0	21.2	
Chippewa	-----	455	3.9	18.8	
Menominee	-----	426	11.8	20.3	S
B 2924-8	B 608-56 x B 594-46	372	6.6	19.6	LB
L.S.D. at 5%		126.2			
" 1%		167.5			

1/ LB¹ signifies gene R₁ and LB² R₂ for late blight resistance.

S = scab; VA = virus A

WISCONSIN
R. H. Larson and R. V. Akeley

Incidence of Physiological Internal Tuber Necrosis

Field tests for differences in susceptibility to the nonparasitic internal tuber necrosis in late-planted (June 8) potatoes were continued on Plain-field sand in central Wisconsin at the Hancock Station during 1954. Two standard, three recently introduced, and four seedling potato varieties were compared, and the indices of internal necrosis are presented in the Larson-Akeley table 1.

Larson-Akeley table 1. Incidence of internal tuber necrosis, 1954.

<u>Variety or seedling</u>	<u>Internal necrosis index ^{1/}</u>
	<u>2/</u>
Katahdin	47.3
Ontario	80.9
Saco (B 606-67)	21.1
Merrimack (B355-44)	25.1
Delus (B 73-18)	71.1
N.C. 880-4	.0
B 595-76	23.1
B 579-3	47.7
B 2368-4	84.2

1/ Randomized sample of 300 U.S. No. 1 tubers from 200-ft. planting.

2/ Index: 100 = All tubers severe necrosis.
0 = All tubers free of necrosis.

The method of calculating amount and degree of internal tuber necrosis is the same as that given in the Jour. Agr. Res. 71: 487-505, 1945, and Amer. Potato Jour. 26: 427-431, 1949.

Katahdin and Ontario were used because of their susceptibility to internal tuber necrosis and adaptability to growing conditions in central Wisconsin.

WISCONSIN

G. H. Rieman and Donald A. Young

I. North Central Regional Potato Trial

Thirteen advanced-generation potato selections from five States located in the North Central region were tested in a regional adaptation trial. Irish Cobbler, Triumph, and Katahdin were used as check varieties. Records were taken on maturity, yields over 1 7/8 inches in diameter, specific gravity, and internal tuber defects.

The following selections were considered to be the best in the 1954 NC trial in Wisconsin:

- | | |
|-----------------|-----------------|
| 1.--ND 457-1-6 | |
| 2.--Wis 0103.51 | 4.--Minn 11 |
| 3.--Neb 2644-1 | 5.--ND 2124-2OR |

II. Effect of Virus X on Yield in the Chippewa Potato Variety

The clonal lines of Chippewa listed in Rieman table 1 have been used to continue a study started during 1950 to determine the effect of virus X on yielding ability in the potato. The 1954 results are similar to those obtained during 1953. It appears desirable to continue the yield tests for 4 years since the differences between strains are consistent but small.

The 11 virus-X infested Chippewa clonal lines produced smaller crops than the virus-X-free (XF) Chippewa clonal line. The average reduction was 46 bushels per acre. The 5-strain of virus X in the Chippewa line 5- Inoc. again exhibited an attenuated interaction. However, its reduced effect on yield appeared to be similar to several other mild strains of virus X in the 1954 trials.

Rieman table 1. North Central advanced-generation trial, 1954.

Variety	Maturity	Yield per acre	Total solids	Internal defects		
				Hollow heart	Necrosis	Normal tubers
		Bu.	Pct.			
ND457-1-16	E	245	20.6	-	-	100
Wis. 1429	E	218	20.4	-	-	100
Irish Cobbler	E	214	22.5	2	-	98
Wis. D27.50	E	220	19.4	-	2	98
Neb. 2644-1	E	275	22.5	-	-	100
Neb. Sheridan	E	239	20.9	-	-	100
Triumph	E	244	20.6	-	-	100
Min 1	M	213	20.4	-	6	94
Min 18	M	227	22.1	-	-	100
ND 2231-2	M	202	22.7	-	2	98
Neb Redglo	M	174	19.9	-	-	100
Min 11	L	227	20.1	-	-	100
ND 2124-20R	L	240	21.9	4	-	96
Katahdin	L	216	21.6	-	-	100
Wis. 0103.51	L	254	20.9	-	-	100
Mich BP50-8	L	234	21.9	-	-	100

Location, Rhinelander, Wis.; soil type, sandy loam; fertilizer treatment, 900 lb. 3-12-12 row; date planted, May 10, 1954; size of plots, 25 hills; spacing, hills 1 ft.; rows 3 ft; replicates 4; total solids, mean of 2 replications.

Growing Conditions: Normal, except for 3 weeks of severe drought in August. Good test for resistance to drought; fungicide, Parzate, 7-day schedule; insecticide, DDT, 14-day schedule; stands uniform, few plots with 1 or 2 missing hills.

Rieman table 2. Yields of 10 Chippewa lines infected with mild strains of virus X and one Chippewa line (XF) free from virus X.

Chippewa strains	Yield per acre
	Bu.
20 Reg.	455
20 Inoc.	471
WB Reg.	440
WB Inoc.	454
Rus. Reg.	469
Rus. Inoc.	469
9 Reg.	388
9 Inoc.	477
5 Reg.	427
5-Inoc.	473
5+ Inoc.	436
XF	497

WYOMING

Wm. A. Riedl, C. M. Rincker, J. R. Vaughn, and G. W. Arnold

The work in Wyoming consisted of testing varieties and promising seedlings for yield, specific gravity, and for resistance to scab. Crosses were made between promising red skin seedlings and adapted commercial varieties resistant to scab and ring rot.

Variety Yield Trials and Seedling Increase

Yield trials were conducted at 4 locations. At Laramie 18 varieties and 34 promising seedlings were grown in 3 yield trials. These were planted in rows 40 feet long and replicated 4 times. In addition 60 new seedling selections were grown in a preliminary yield trial in 1-row plot 40 feet long without replication. Twenty seedling families were also grown, and selections were made from these families. Twenty promising seedlings were increased.

Variety yield trials were also conducted at the Torrington and Powell Substations. Wyo. tables 1 and 2 give the results of these trials. Ten promising seedlings were increased at Torrington in about 1-acre plots. Twenty promising seedlings and 4 commercial varieties were grown on dry land near Albin in 2-row plots 400 feet long.

Scab Uniform Nursery

The uniform scab nursery grown at Laramie was in soil that was uniformly infested with the scab organisms. Infection was not heavy, as indicated in Wyo. table 3. The figures in the table show the area covered, pustule type, and percentage of marketable tubers.

Wyo. table 1. Potato variety trial, Torrington, Wyo., 1954.

Variety	Total yield per acre	U.S. No. 1 per acre	Rank	U.S. No. 1	Rank	Dry matter
	Bu.	Bu.		Pct.		Pct.
LaSoda	726	557	1	77	6	18.83
2650	717	301	18	42	18	18.62
Red Pontiac	711	460	6	65	16	18.40
BT	679	454	7	67	14	19.47
2646	679	487	5	72	12	17.97
2483	659	529	2	80	1	19.69
2541	634	495	3	78	3	18.40
2550	632	492	4	78	3	19.47
DeSota	585	422	9	72	12	18.62
Progress	584	383	14	66	15	19.90
2558	567	454	7	80	1	21.61
Dazoc	538	416	10	77	6	19.04
2485	525	392	11	75	9	21.18
Early Gem	523	313	17	60	17	17.33
2556	516	389	12	75	9	20.33
Sheridan	508	387	13	76	8	18.62
2548	476	349	16	73	11	19.04
2484	469	365	15	78	3	19.69
L.S.D. .05	103	88				

Wyo. table 2. Potato yield trial, Powell, Wyo., 1954.

Variety	Total yield per acre	U.S. No. 1 per acre	Rank	U.S. No. 1	Rank
	Bu.	Bu.		Pct.	
2650	563	384	3	68	16
2550	510	414	1	81	1
2541	508	364	4	72	10
Sheridan	503	387	2	77	4
2646	502	357	5	71	12
Red Pontiac	447	344	8	77	4
2556	440	326	9	74	8
DeSota	434	346	6	80	3
2598	427	346	6	81	1
2483	416	276	11	66	17
Dazoc	371	280	10	76	6
Russet Burbank	362	263	12	73	9
Progress	361	259	13	72	10
Bliss Triumph	356	247	14	69	13
2484	345	238	15	69	13
Red McClure	334	231	16	69	13
2485	297	191	17	64	18
2548	216	162	18	75	7
L.S.D. .05	122	107			

Wyo. table 3. Potato scab uniform nursery, Laramie, Wyo., 1954
by John R. Vaughn.

Variety or seedling	Replication 1			Replication 2		
	AR	TY	Marketable	AR	TY	Marketable
			Pct.			Pct.
1 B 962-3	1	2	70	1	2	70
2 B 2162-36	0	0	70	0	0	80
3 B 2162-49	Tr	1	50	Tr	1	50
4 B 2368-4	Tr	1	80	2	4	90
5 B 2368-11	Tr	1	60	1	3	70
6 B 2368-13	1	2	60	2	3	60
7 B 2874-4	Tr	2	50	Tr	2	60
8 B 2879-4	Tr	1	90	Tr	2	80
9 B 2887-2	1	2	60	1	2	90
10 B 2920-20	Tr	1	60	1	2	50
11 B 2922-15	2	3	70	1	3	20
12 B 2922-26	2	3	60	1	2	50
13 B 2968-56	1	3	60	1	2	60
14 B 3003-27	1	3	60	2	2	30
15 B 3003-36	1	2	60	Tr	1	60
16 B 3004-9	1	2	10	2	2	60
17 B 3006-22	Tr	2	50	2	2	70
18 B 3014-6	1	1	30	Tr	1	70
19 B 3097-16	Tr	1	60	1	2	50
20 B 3107-17	1	2	30	1	2	50
21 B 3114-52	2	3	60	1	2	60
22 B 3140-36	3	3	30	1	3	60
23 B 3309-2	1	3	50	1	3	70
24 B 3310-5	3	2	0	2	2	90
25 B 3334-6	2	3	90	1	2	80
26 Ontario	Tr	2	60	Tr	1	50
27 Russet Burbank	Tr	2	30	1	2	10
28 Early Gem	Tr	1	70	0	0	50
29 Osage	2	2	50	3	3	60
30 Triumph	2	3	50	3	2	60
31 B 73-10	1	2	60	Tr	1	60
32 Delus	3	4	10	4	5	0
Check 1	2	3	60			
Check 2	2	4	50			
Check 3				3	3	50
Check 4				2	3	50

